DOCUMENT RESUME

ED 207 611 IR 009 730

AUTHOR	Schuler, S. C., Ed.
TITLE	Manual of Documentation Practices Applicable to Defence-Aerospace Scientific and Technical Information. Volume IV: Sections 10--Security Storage and Control; 11--Organization and Management; 12--Networks and External Sources of Information.
INSTITUTION	North Atlantic Treaty Organization, Neuilly-sur-Seine (France). Advisory Group for Aerospace Research and Development.
REPORT NO	AGARD-AG-235; ISBN-92-835-1382-7
PUB DATE	Mar 81
NOTE	129p.; For related documents, see IR 009 727-730.
EDRS PRICE	MF01/PC06 Plus Postage.
DESCRIPTORS	*Databases; Information Centers; Information Dissemination; *Information Networks; Information Processing; Information Services; International Programs; *Library Administration; Library Networks; Organization; Program Budgeting; Staff Role; *Telecommunications
IDENTIFIERS	*Document Security; *Scientific and Technical Information

ABSTRACT

The last of four volumes in a series describing the basic documentation practices involved in the initial setting up and subsequent operation of an information-library organization to provide defense-aerospace scientific and technical information services, this manual consists of three sections. In "Security Storage and Control," Michael Sims describes the organization and administration of the security arrangements in a documentation center, and discusses the need for both physical and personnel security; security requirements for documents from the publication stage through final disposal and for items in various formats; and protection required in peripheral areas, e.g., reprographic and computer rooms. "Organisation and Management," by Diana Leitch, discusses the establishment of a technical information center; its aims and objectives; identification and fulfillment of user requirements; management and planning; the role of the staff; budget management; stock control; the impact of mechanization; and promotion of the center's services. "Networks and External Sources of Information," by Philip Eckert and others, reviews the basic functional aspects of telecommunications, text searching, and networking. Some commercial and non-commercial information networks operational in the U.S. and Europe are described, and details of services offered and contact points are provided for selected external online bibliographic databases on specific topics. (RAA)

****
* Reproductions supplied by EDRS are the best that can be made *
* from the original document. *
****

ED207611

U S DEPARTMENT OF HEALTH,
EDUCATION & WELFARE
NATIONAL INSTITUTE OF
EDUCATION

THIS DOCUMENT HAS BEEN REPRODUCED EXACTLY AS RECEIVED FROM THE PERSON OR ORGANIZATION ORIGINATING IT. POINTS OF VIEW OR OPINIONS STATED DO NOT NECESSARILY REPRESENT OFFICIAL NATIONAL INSTITUTE OF EDUCATION POSITION OR POLICY

AGARD-AG-235
Volume IV

NORTH ATLANTIC TREATY ORGANIZATION

ADVISORY GROUP FOR AEROSPACE RESEARCH AND DEVELOPMENT

(ORGANISATION DU TRAITE DE L'ATLANTIQUE NORD)

AGARDograph No.235

MANUAL OF DOCUMENTATION PRACTICES APPLICABLE TO DEFENCE-AEROSPACE SCIENTIFIC AND TECHNICAL INFORMATION

VOLUME IV
containing

Section

10 – SECURITY STORAGE AND CONTROL
11 – ORGANISATION AND MANAGEMENT
12 – NETWORKS AND EXTERNAL SOURCES OF INFORMATION

(The complete Publication Layout appears on page iv.)

IR009730

This AGARDograph has been prepared at the request of the Technical Information Panel of AGARD.

THE MISSION OF AGARD

The mission of AGARD is to bring together the leading personalities of the NATO nations in the fields of science and technology relating to aerospace for the following purposes:

- Exchanging of scientific and technical information;
- Continuously stimulating advances in the aerospace sciences relevant to strengthening the common defence posture;
- Improving the co-operation among member nations in aerospace research and development;
- Providing scientific and technical advice and assistance to the North Atlantic Military Committee in the field of aerospace research and development;
- Rendering scientific and technical assistance, as requested, to other NATO bodies and to member nations in connection with research and development problems in the aerospace field;
- Providing assistance to member nations for the purpose of increasing their scientific and technical potential;
- Recommending effective ways for the member nations to use their research and development capabilities for the common benefit of the NATO community.

The highest authority within AGARD is the National Delegates Board consisting of officially appointed senior representatives from each member nation. The mission of AGARD is carried out through the Panels which are composed of experts appointed by the National Delegates, the Consultant and Exchange Programme and the Aerospace Applications Studies Programme. The results of AGARD work are reported to the member nations and the NATO Authorities through the AGARD series of publications of which this is one.

Participation in AGARD activities is by invitation only and is normally limited to citizens of the NATO nations.

Published March 1981

Copyright © AGARD 1981
All Rights Reserved

ISBN 92-835-1382-7

Set and printed by Technical Editing and Reproduction Ltd
Harford House, 7–9 Charlotte St, London, W1P 1HD

GENERAL FOREWORD

The purpose of this Manual is to describe in a series of separately-published Volumes the basic documentation practices which are involved in the initial setting up, and subsequent operation of an Information-Library Organisation to provide defence-aerospace scientific and technical information services.

- The manual is primarily intended for the main defence-aerospace information centres in the smaller nations, and the specialised defence establishments and defence contractors in the larger NATO countries.

- For those information centres which already have a well-developed system, the manual may prove helpful in the work of analyzing and evaluating existing system performance, or in revising an ineffective system. An important subsidiary objective is therefore to encourage the greater use of modern techniques of information processing.

- The manual endeavours to meet the needs of a wide spectrum of readers – the senior man concerned with setting up a new system, as well as junior staff who may be using the manual as a training aid.

- The various Sections aim to focus on the problems and techniques associated with processing unpublished reports and related information, rather than conventional book-journal libraries. Emphasis is on practical solutions and, where appropriate, useful operating suggestions.

The manual has been planned by the AGARD Technical Information Panel and consists of four Volumes comprising twelve Sections in all, each prepared by a well-known expert in the field. The Publication Layout is given on the following page. A comprehensive index to the four volumes is in preparation and will be published separately.

S.C.SCHULER
General Editor
(Former Chairman, AGARD
Technical Information Panel)

MANUAL OF DOCUMENTATION PRACTICES APPLICABLE TO DEFENCE-AEROSPACE SCIENTIFIC AND TECHNICAL INFORMATION

PUBLICATION LAYOUT

Section

VOLUME I

1 ACQUISITION & SOURCES, by P.F.Eckert
Types of material, screening, evaluation, sources in Governments and other countries, information on current research

2 DESCRIPTIVE CATALOGUING, by B.P.Gladd, O.G.Luchaka and J.C.Wade
Functions, standardisation, corporate authors and other compatibility factors, document process sheets, manual and computer translations

3 ABSTRACTING & SUBJECT ANALYSIS, by T.C.Bearman
Abstracting standards, descriptor allocation, thesaurus, computer-aided indexing

VOLUME II

4 DATA RECORDING & STORAGE, by J.H.Petrie
Data preparation rules, handling chemical compounds and scientific symbols, etc., card systems, tape typewriters, introduction to computerised operations

5 MECHANIZATION SYSTEMS & OPERATIONS, by V.J.Rogers
Basic mechanisation, in-house computer, minicomputers, bureau working

6 ANNOUNCEMENT SERVICES & PUBLICATIONS, by E.H.Ridler
Selective dissemination of information, bulletin production, newsletters and digests, bibliographies

VOLUME III

7 INFORMATION RETRIEVAL, by T.Norton
Manual systems, searching by computer, inverted files, KWIC/KWOC, on line systems, batch working, packaging of computer output

8 DISSEMINATION PRACTICES, by F.S.Dyer
Register of users, initial distribution, specific requests, recording and recall, guidelines on sensitive aspects, state of art reviews, translations, survey of dissemination practices in various countries.

9 MICROFORM SYSTEMS AND REPROGRAPHY, by P.Rolls
Preparation and reproduction of technical publications, microfiche preparation and duplication, COM/CIM, readers and printers, photocopying, printing processes

VOLUME IV

10 SECURITY STORAGE & CONTROL, by M.G.Sims
Security gradings, access to sensitive documents, physical security, control of document movements

11 ORGANISATION & MANAGEMENT, by Dr D.M.Leitch
Aims and objectives, staffing, promotional activities, identifying users

12 NETWORKS & EXTERNAL SOURCES OF INFORMATION, by P.F.Eckert, H.G.Wyne, W.A.Martin and A.Bodini
National and international networks, telecommunication equipment, line techniques, data bases available, costs involved

13 INDEX TO VOLS I–IV*

---

* To be issued later.

Section 10

SECURITY STORAGE AND CONTROL

by
Michael G.Sims A.L.A.
United Kingdom

ABSTRACT

This section describes the organization and administration of the secuirity arrangements in a Documentation Cent·e and discusses the problems raised by the need for both physical and personnel security.

Document security requirements are considered for the publication stage, through to issuing, dissemination, release, filing, storage, handling, circulation control, downgrading and final disposal.

The differing requirements for security of items in various formats are discussed, and the protection required in peripheral areas such as reprographic and computer rooms are also considered.

CONTENTS

		Page
1.	**INTRODUCTION**	5
	1.1 General Background	5
	1.2 Types of Security	5
	1.2.1 Physical Security	5
	1.2.2 Personnel Security	6
	1.3 Storage Arrangements	6
	1.3.1 Subject	6
	1.3.2 Originators – Corporate Authors	6
	1.3.3 Series	6
	1.3.4 Personal Authors	6
	1.3.5 Accession Numbers	6
2.	**SECURITY GRADING OF DOCUMENTS**	7
	2.1 Allotting Security Gradings	7
	2.2 Military Security Categories	7
	2.3 International Security Categories	8
	2.4 Special Markings and Caveats	9
	2.5 Industrial and Commercial Gradings	9
	2.6 Privacy Markings	9
	2.7 Protection of Proprietary Information	9
3.	**ACCESS TO SENSITIVE DOCUMENTS**	10
	3.1 Personnel Security	10
	3.2 Authority-to-Know	10
	3.2.1 Authority-to-Know of On-Site Users	10
	3.2.2 Authority-to-Know of External Borrowers	10
	3.3 Need-to-Know	11
	3.3.1 Need-to-Know of On-Site Users	11
	3.3.2 Need-to-Know of External Borrowers	11
	3.4 Need-to-Retain	13
	3.4.1 Need-to-Retain by On-Site Users	13
	3.4.2 Need-to-Retain by External Borrowers	13
	3.5 Need-to-Copy	13
	3.6 Conditions of Release	13
	3.7 Release Procedures	14
4.	**PHYSICAL SECURITY**	14
	4.1 Filing and Storage	14
	4.1.1 Layout of Documentation Centre	14
	4.1.2 Filing Systems	14
	4.2 Store Room Security	15
	4.3 Security of Catalogues	15
	4.4 Security of Microforms	15
	4.5 Security in Reprographic Rooms	16
	4.5.1 Security of Personnel	16
	4.5.2 Physical Security of the Reprographic Room	16
	4.5.3 Documentation Security	16
	4.6 Security in Computer Rooms	16
	4.7 Security of Library Equipment	17
	4.8 Security Against Environmental Factors	17
5.	**CONTROL OF MOVEMENTS OF DOCUMENTS**	17
	5.1 Processing of Documents	17
	5.1.1 Processing of Draft Documents	18
	5.1.2 Preparation of Documents for Issue	18
	5.2 Security During Transmission	19
	5.2.1 Transmission to On-Site Borrowers	19
	5.2.2 Transmission to External Borrowers	19
	5.3 Issuing Systems and Circulation Control	19
	5.3.1 Manual Systems	22
	5.3.2 Automated Systems	22
	5.4 Handling and Custody of Documents by Borrowers	22
	5.4.1 Mustering	23
	5.4.2 Spot Checking	25

6. **HOUSEKEEPING** 25
- **6.1 Downgrading** 25
- **6.2 Regrading** 28
- **6.3 Declassification** 28
- **6.4 Reviewing and Weeding** 28
  - *6.4.1 Reviewing and Weeding on Receipt* 28
  - *6.4.2 Reviewing and Weeding of Existing Stock* 29
- **6.5 Archives** 29
- **6.6 Destructions** 29
  - *6.6.1 Destruction of Paper Copies* 30
  - *6.6.2 Destruction of Microfilm* 30

7 **REFERENCES** 30

LIST OF TABLES & FIGURES

Page

TABLES

Table 1 Side by Side Listing of Military Security Categories 8

FIGURES

Figure 1 Typical layout of form for issue of documents to external recipients 12

Figure 2 Example of processing form for draft reports 20

Figure 2A Example of processing form for draft reports (continued) 21

Figure 3 Typical layout of form for self-muster 24

Figure 4 Typical form for grading and downgrading of documents 26

Figure 5 Typical layout of form for routine downgrading 27

1. INTRODUCTION

1.1 General Background

Any documentation centre which is responsible for handling a large number of documents will experience problems in deciding which items to obtain, in which form to obtain them (e.g. in paper copy or microfiche), how to catalogue, classify, index or abstract them, how to make them available to borrowers, how to store them, and finally how to decide and apply policies for retention and destruction. If the collection contains a large element of classified or otherwise sensitive documents these difficulties are likely to increase because of the need for accountability of documents, clearance procedures and need to know of users, changes of classification caused by downgrading, and general security requirements.

Security has been defined by Daigie[1] as the "determination and application of appropriate security measures to information that is identified and designated as requiring protection". Classification determines what information is classified, identifies the document that contains that classified information and protects it through marking, through control of access to the information, and through control of access to the areas where that information is recorded and available.

Because of its very nature, its functions and its collection, the documentation or information centre of a defence organization is deeply involved in security. Staff working in the centre must be aware constantly of their duty to meet and apply security regulations. There are, generally speaking, no short cuts, and it is essential to have a good working relationship between the organisation's Security Section and the documentation centre.

The influence of security requirements extends into almost all areas of defence library administration and the maintenance of adequate records and control procedures is of great importance. Lax handling may result in compromise or even loss of classified documents and this is likely to have serious consequences. Such requirements have therefore resulted in the development of special techniques of document handling.

The aim of this section of the manual is to define therefore the types of material to be protected and the form of security required. It also reviews some of the problems raised, and suggests a number of alternative solutions available. It does not attempt to give hard and fast rules, as the methods to be adopted will of course vary according to circumstances.

Within the overall framework of security requirements document control is perhaps most vital. This was recognized by the Radcliffe Report[2]. A 'document' is usually considered as a paper or 'hard' copy, and in a documentation centre it is possible that the majority of material will be in that form. However other formats may have to be handled such as microfilm, microfiche, microfiche jackets, aperture cards, computer punched tapes, punched cards, magnetic tapes and discs, illustrations, photographs, maps or charts. They may be written in manuscript, typed, duplicated or reproduced photographically, photographic negatives, cinematographic films, or dictated recordings.

This wide range of document formats reveals immediately one of the main difficulties of administering the security arrangements of a documentation centre. It is not easy to devise a set of rules which will suit all of the above. Furthermore it is important that any regulations are unambiguous and easy to follow so as to ensure effective implementation by the staff involved.

1.2 Types of Security

There are broadly speaking two main types of security, namely physical security (that is, the protection of the building and its contents) and personnel security (that is, matters concerning the people who have access to the building and may be allowed to handle the contents). In this section of the manual these two aspects are considered separately although they are interelated and of equal importance.

1.2.1 Physical Security

This is discussed in detail in Chapter 4 but the following general points will have to be borne in mind when the organization and administration of a documentation centre is being considered.

- Protection against persons or organizations with sinister motives.
- Protection against loss of material either accidentally or deliberately.
- The different problems involved in the protection of commercial and military information.
- Protection of material in different formats.
- Safeguarding material against natural disasters such as fire or flood.
- Observance of the differing security requirements placed on documents by the various originators and suppliers. These requirements may not be always compatible.
- Problems of safeguarding documents when they are away from the documentation centre.
- Recording all movements of documents.

- Protection not only of the primary publications, but of the secondary documents deriving from them, for example, accessions lists, abstract bulletins, and catalogues.
- Protection of equipment such as photocopiers, against unauthorized usage.
- Protection during 'silent hours'.

1.2.2 Personnel Security

These aspects are described in greater detail in Chapter 3, but the three main factors to be taken into account are:–

- Security of personnel who are employed within the centre.
- Security of persons who have rights of access to, or loan of material from, the centre.
- Security of persons having casual access to the centre e.g. service engineers, office cleaners etc.

1.3 Storage Arrangements

In a documentation centre holding classified material, an important policy consideration is to decide whether to file all documents together, or whether classified and unclassified items should be stored separately. The advantages and disadvantages of each are discussed in paragraph 4.1, but the decision reached will affect the method of arrangement on the shelves. There are several systems for so arranging publications, and this section examines the various methods and discusses the advantages and disadvantages of each

1.3.1 Subject

At a first glance this method would appear to have a great deal to recommend it, and it is the system favoured by Walkins[3]. In an open access centre it may be possible and even desirable to bring together all documents on a particular subject so that borrowers may browse through the shelves. It may also assist the centre to compile bibliographies, literature surveys and catalogues. However, it is unlikely that centres which hold sensitive documents will permit customers direct access to the shelves, and this makes the subject approach less attractive. Furthermore this method poses practical problems, because many documents deal with more than one subject. Therefore there would need to be either an elaborate cross referencing system, or multiple copies of reports would need to be obtained and filed in each relevant subject area. In addition it would be necessary to leave space for expansion in each subject area. It is concluded therefore that the subject approach is probably suitable for only the smallest collection of documents.

1.3.2 Originators – Corporate Authors

Arranging reports by the corporate author has some attractions. A large number of enquiries will be received for reports written by specific organizations, and this method of arrangement would facilitate retrieval. However there are often difficulties in assigning corporate authors to reports, and in particular it may not be easy to maintain consistency. Many reports may have more than one originator particularly in the case of those written by sub-contractors, and many organizations will change their names over the years as a result of reorganisation, takeovers, etc. It would be necessary to leave space for expansion at many places, and would require the extra copies or cross-referencing described in paragraph 1.3.1.

1.3.3 Series

This arrangement is an extension and refinement of corporate author order. Therefore it has similar advantages and disadvantages to that arrangement. It is in effect a system of sub-division within originator order. The main difficulty is that some reports do not have an easily recognisable report number, and other documents have more than one. However this method will be attractive in a collection which contains publications originating mostly from one corporate author, and many industrial documentation centres use this filing arrangement for their own company reports. It is not to be recommended however for centres which have documents from a wide range of originators.

1.3.4 Personal Authors

This method has little to recommend it, and there are several practical disadvantages. Many reports do not have personal authors, and an author may change his style of name over a period, thus making it difficult to file all his publications together. Furthermore, many reports are written jointly and it would be necessary to have extra copies or refer from second and subsequent authors.

1.3.5 Accession Numbers

In a large centre holding a wide cross-section of reports this may well be the most effective arrangement for limited access documents. Using this method every publication added to stock is given a consecutive number and this number is used as the filing point. The main advantages of this method are that there should be no possibility of ambiguity regarding the identity of a document and that space for additions to stock can be conveniently provided. With most of the other arrangements already outlined, some professional expertise may be required in deciding the filing point, the

allocation of the accession number would be purely a clerical exercise. Furthermore if a document is given a unique reference number at the outset it may well assist in any future automation of information retrieval or housekeeping routines.

The main disadvantages of arrangement by accession number are that it is an artificial system, and may be an added barrier between user and document. This latter point could become an advantage where sensitive documents are involved. More importantly this method may result in the separation of a document published in several parts which are received at different times.

2. SECURITY GRADING OF DOCUMENTS

2.1 Allotting Security Gradings

Good document security demands that all publications are classified correctly, and marked clearly with the appropriate security gradings and additional markings. Some organizations will nominate specific officers who are authorized to allocate security gradings, whilst others will expect the author's senior officer to confirm any markings allocated by the writer.

Yates[4] cites as an example the United Kingdom Atomic Energy Authority which expects its senior technical managers to allocate gradings whilst they are scrutinizing the reports for technical approval. A special section then checks the documents for any commercial information and allots any special proprietary markings. These special markings take into account the views of patent officers and any agreements with British Industry. This section also decides whether there should be any distribution limitations or whether the publication may be made available to the public.

Several methods of allocating security classifications are available and these include:–

- Deciding upon the overall security classification of the document and marking the covers and all pages with that classification.
- Giving each page of text its own individual security classification, and then marking the cover with the highest overall grading.
- Giving a security classification to each paragraph, and marking each page with the highest classification of that page. The cover of course would be marked with the overall classification.
- Additionally, some organizations require a separate security classification to be given to the document title and abstract.

In 1977 the American Society for Classification Management[5] made certain recommendations concerning the philosophy of allocating security gradings, and these can be regarded as constituting good practice. The most important recommendations include:–

- The person who is the classification authority should be held responsible for the security classification that he allocates.
- Unnecessary classification and overclassification should be avoided.
- The classification authority should ensure that classification guides are issued for the subject matter within its jurisdiction.
- The classification guide should be issued at an early stage, but certainly no later than the original proposal for funding.
- The guides, which should themselves be unclassified, should be reviewed every other year, or sooner if necessary.
- Security markings should be allocated solely on the basis of national security.
- Security markings should not be used to conceal inefficiency or administrative error, to prevent embarrassment to an individual or department, or simply to prevent the release of information which does not require protection in the interest of national security.

2.2 Military Security Categories

In centres which handle defence documentation, a heavy emphasis is likely to be placed on military security, which will involve the safeguarding of information concerned with the activities of the armed forces. It is essential that staff working in the centre are aware of the various categories of gradings and of the controls required.

Most countries use a basic four-tier security classification structure which, broadly speaking corresponds in ascending order of sensitivity to the British classification of Restricted, Confidential, Secret and Top Secret. The definitions of each of the classifications vary from country to country and cannot be quoted here. There are some exceptions to this four-tier hierarchy, notable amongst which, is that the United States of America does not use a Restricted marking category.

Klopp[6] provided a side by side comparative listing of the military security categories used by a large number of countries, together with the equivalent NATO markings. This list whilst not exhaustive is reproduced as Table 1.

TABLE 1

Side by Side Listing of Military Security Categories

NATO	COSMIC TOP SECRET	NATO SECRET	NATO CONFIDENTIAL	NATO RESTRICTED
BELGIUM	TRES SECRET	SECRET	CONFIDENTIAL	DIFFUSION RESTREINTE
CANADA	TOP SECRET	SECRET	CONFIDENTIAL	RESTRICTED
DENMARK	YDERST HEMMELIGT	HEMMELIGT	FORTROLIGT	TIL TJENESTEBRUG
FRANCE	TRES SECRET	SECRET-DEFENSE	CONFIDENTIEL-DEFENSE	DIFFUSION RESTREINTE
GERMANY	STRENG GEHEIM	GEHEIM	VS-VERTRAULICH	VS-NUR FUR DEN DIENSTGEBRAUCH
GREECE	AKROS APORRITON	APORRITON	EMPISTEFTIKON	PERIORISMENIC CHRISSEOS
ITALY	SEGRETISSIMO	SEGRETO	RISERVATISSIMO	RISERVATO
LUXEMBOURG	COSMIC TRES SECRET	SECRET	CONFIDENTIEL	DIFFUSION RESTREINTE
NETHERLANDS	ZEER GEHEIM	GEHEIM	CONFIDENTIEEL OR VERTROUWELIJK	DIENSTGEHEIM
NORWAY	STRENGT HEMMELIG	HEMMELIG	KONFIDENSIELT	BEGRENSET
PORTUGAL	MUITO SECRETO	SECRETO	CONFICENCIAL	RESERVADO
TURKEY	COK GIZLI	GIZLI	OZEL	HIZMETE OZEL
UNITED KINGDOM	TOP SECRET	SECRET	CONFIDENTIAL	RESTRICTED
UNITED STATES	TOP SECRET	SECRET	CONFIDENTIAL	–

2.3 International Security Categories

Documents which are intended for circulation on a need to know basis within international defence organisations are likely to require security markings over and above the classification described in Table 1. Furthermore publications which are produced by those organizations will need similar markings. They may also carry specific security warning notices so that each recipient government will be able to handle the document in a particular way.

Some examples of these international organizations who may need to identify and protect their information are:–

- North Atlantic Treaty Organization.
- Central Treaty Organization.
- South East Asia Treaty Organization.
- Western European Union.

Many of the publications issued by, or circulated within these organizations may well require to be handled as "accountable documents" and will require special handling such as mustering, signatures upon receipt etc., as described elsewhere in this section.

In some organizations these documents may not be handled by the centre, but by a special international document registry. A decision on this may be made outside the centre, and is likely to depend on such matters as the number of such publications received or require distribution.

2.4 Special Markings and Caveats

In addition to their normal security classifications some documents may well carry additional markings or caveats. These markings are not security classifications in themselves, but are intended to complement or reinforce those gradings. They are designed to indicate that the item may require special precautions to be taken in addition to those normally needed for documents of a similar classification. It is therefore important that staff of the centre are able to identify and interpret the meaning of caveats.

Each country is likely to use its own specially designed notation systems and specific examples and their definitions are not within the scope of this Section. Suffice it to say that the meaning of caveats should be brought to the notice of all recipients.

Supplementary markings and caveats may be used to convey some or all of the following security information: –

- The country which owns or originated the security classified information.
- Whether any of the information is owned jointly by another country.
- Whether the document may be seen only by selected groups or by specific countries.
- Whether there is any restriction on announcing the existence of the document.
- What action should be taken when the item is no longer required.

2.5 Industrial and Commercial Gradings

In addition to reports originating from military or defence organizations, many centres will receive material published by industrial and commercial undertakings, or by trade associations.

If the document has been written as the result of a defence contract it is likely to carry national security markings, but in other cases the originator may use an assortment of markings including words such as "Secret" or "Confidential" to indicate commercial sensitivity. It is this lack of standardisation which may well pose the greatest problem to staff handling such documents.

Management will need to ensure that all recipients are aware of their responsibilities when controlling items which are marked with annotations such as "Commercial in Confidence", "Confidential to Members", "In Confidence". In cases of doubt it may be necessary to handle such documents in accordance with local security regulations until the advice and guidance of the originator has been obtained. It may also be advisable to clarify the position of such markings in the light of possible proprietary information.

2.6 Privacy Markings

Privacy markings such as "Personal", "Staff in Confidence", or "Management in Confidence" etc. may be used to indicate that a need exists for special protection or particular handling, even though the document may not be security classified. The intention of these markings is to protect information which by its very nature is sensitive.

It is perhaps unlikely that general documentation centres will receive more than a small number of documents with this type of marking but nevertheless it is vital that staff are able to recognise them and have knowledge of the handling and control regulations. In order to assist in the very necessary protection many organizations issuing such sensitive material provide the added safeguard of listing the names of those who may see a particular document. Such items may carry an extra protective marking such as "For Named Recipients Only".

It is perhaps worth adding that in cases where a document is marked with both a privacy notice and a security grading, the centre will be expected to respect the regulations relevant to both categories.

2.7 Protection of Proprietary Information

If a document contains commercial information which may be of interest to a competitor it is vital to ensure that the contents are protected. This may be achieved either by applying the same level of control as given to security classified material, or by obtaining legal protection, for example by patenting an invention or innovation. A system for producing and handling documents containing proprietary information, has been described by Gerrard and Lyle[7]. Briefly the procedure requires the issue of a "birth certificate" for every new document. This record is used to control the distribution, to note the security gradings, and to ensure that drafts are processed correctly through all the approval and publication stages.

In cases where commercially sensitive information is involved, the following points may need to be considered when establishing a system for protecting documents.

- The necessity to control availability and circulation.
- Application of a "need to know" principle.
- The requirement to exchange information with other organizations under agreements or licencing arrangements.

- Protection of information by indicating any special restrictions on availability. This may cover such aspects as any special arrangements with other countries.
- Indication of instances where proprietary rights may be owned by an organisation other than the originator of the document.
- The need to record any amendments or corrections.
- The possible requirement to produce or distribute an expurgated or edited version of a document.

A decision on whether to patent a particular item, will be made by top level management, and the processing of patent applications will be the responsibility of specialist staff. However it is likely that the centre will need to maintain close liaison with the Patents Section of the organization, and with the research and development department. Newby[8] has described in detail the various aspects of patents and how they affect staff involved in information and documentation work.

3. ACCESS TO SENSITIVE DOCUMENTS

3.1 Personnel Security

Only persons having the authority of the appropriate Defence Department are entitled to obtain access to classified documents, or those containing military information. Usually the mechanics of the security clearance of such personnel is arranged by the organization's Security Department and not by the documentation centre. This aspect is not within the terms of reference of this section. However, it follows that all staff working in the centre, and handling classified or sensitive material will themselves need authorization for access to the documentation. Furthermore it will be the responsibility of the staff of the centre to ensure that all persons visiting the centre or requiring access to documents are authorised to do so.

Persons requiring access or making application for documents will fall into two main categroies:–

- Persons employed by the organization or establishment served by the centre.
- Persons employed by other organizations. This status will include staff employed by other defence establishments, by contractors and sub-contractors and by universities or polytechnics. Also nationals of foreign countries who may require information.

Each of the above categories will impose different problems to the centre before access can be granted or document requests processed. The first task of the centre is to establish the identity and status of the potential user, and then to ensure that the requirements of the various clearance authorities are fully complied with.

3.2 Authority-to-Know

If an individual has recived a security clearance for access to information up to and including a particular security classification he is deemed to have an authority to know that information.

3.2.1 Authority-to-Know of On-Site Users

In the documentation centre's parent organization this may cause few problems as authority will be or should be well defined. For example an organization may clear all its staff to the same basic level of Secret, with only a few selected staff cleared to the higher level of Top Secret. Therefore the task of the centre is to recognize staff so employed, and many centres will hold a list of authorized users. Only staff appearing in this directory and able to identify themselves would then be able to see and borrow classified publications.

Some establishments, however, will have 'on-site' temporarily-attached staff who have lesser or different authority, and it is essential that any persons with reduced access are recognized immediately. A representative sample of such staff employed at a typical establishment might include on-site representatives of commercial firms, attached military, air-force, or naval personnel, 'lodger' units, and support staff, such as office cleaners and canteen assistants, in addition to the regular employees of the establishment. There may be also visitors who have authority and rights of access. It is the responsibility of senior management to decide clearly and unambiguously the rights of access of every person employed on site who may wish to use the documentation centre. Additionally, it would be helpful if such categories can be identified readily by, for example, wearing different coloured badges.

3.2.2 Authority-to-Know of External Borrowers

Some centres are responsible for releasing information to outside organizations, and this will cause different problems in assessing whether that agency and specific employees have an authority-to-know. One possible answer to that difficulty is to ensure that all documents are issued for the personal attention of a named individual who acts as the approved custodian in that organization. Ideally, he would be either the Librarian or the Security Officer, and it would be his responsibility to ensure that all documents are passed only to those having the authority of both the sending and receiving organizations.

The above pre-supposes that the recipient organization does have an authority, as would be the case when information is supplied by one Government Department to another. The routine may however not be quite so straightforward if a document is being released to an independent organization, and assurances would be required to the following questions:–

- Does the recipient organization have an overall authority?
- Does the recipient have an authority to receive at a particular facility or site?
- Who has the organization nominated to receive and subsequently control information?
- Who will see a document and does he have an authority to know?
- Can the organization ensure that access will be denied to staff not having an authority?
- Do recipients know how to handle classified documents?
- Does the organization have appropriate security storage?
- Is the organization aware of its overall security responsibilities and of the penalties resulting from any infringements which may occur?

It can be useful for the centre to have a formal registration procedure for external users. A good example of a form for this purpose is given on page 81 in Volume III of this Manual, Appendix A-7 which describes procedures in use at DTIC.

3.3 Need-to-Know

Once an authority-to-know has been established it is necessary to ensure that a potential recipient has a need to see that information. Need-to-know is at the very heart of control of classified information but it is not an easy philosophy for a documentation centre to apply and operate.

A report by a United Kingdom Government Committee[9], whilst recognizing the difficulty of applying a strict need-to-know principle, ranks its observance as "the single most important rule in ensuring security of information." It is also probably the cause of most conflict between those who require information and those who supply it.

The need-to-know principle is that information should be disseminated only as widely as is required for the efficient discharge of the work in hand. To ensure this the Committee mentioned above recommended a technique of "formal indoctrination". The policy requires that information about a particular project is limited to a specified list of officers, and each person has to undergo a formal process of education and training before his name is added to that list.

Although a decision on a need-to-know in any particular case will be made by technical managers, the documentation centre will be responsible for ensuring that such a requirement exists, and will be expected to check that need in cases of doubt.

3.3.1 Need-to-Know of On-Site Users

Assessing the need to know of one's own staff members may be relatively simple, and the documentation centre should seek and obtain clear guidance on how to operate the system. There are several options available when formulating a policy. The possibilities include:–

- Decide need-to-know solely on a rank or grade basis.
- Heads of Divisions or Departments to nominate members of their staff who are entitled to know.
- Each application for information to be supported in writing by a senior officer.

3.3.2 Need-to-Know of External Borrowers

Organizing and implementing a need-to-know policy for documents issued outside the parent organization may require a different philosophy, although it is probably even more important for borrowers to prove their need. Most centres will be required to obtain the approval of a senior officer of its own organization and in some cases a Headquarters approval as well before information may be released, and the reason for issue will need to be certified. Such reasons may include the following:–

- The recipient is undertaking a specific feasibility study.
- The information is required in order for the recipient to fulfil a contract.
- The information is required in conjunction with an agreed International Exchange Project.
- The recipient has a legal or statutory right to the information.

An example of a form for external users is shown in Figure 1.

1. By Contractor's Representative.

It is requested that authorization be given for issue of the following reports to .....

Signed by: ..... (Contractor's Representative)

Date: .....

Report Reference	Title

2. By Project Officer.

Authorization is given for the issue of the above reports for a period of ..... and the need to know is confirmed as .....

Signed by: ..... (Project Officer)

Date: .....

3. By Library.

The above reports have today been issued by the Library.

Signed by: .....

Date: .....

4. Library to file.

Fig.1 Typical layout of form for issue of documents to external recipients

3.4 Need-to-Retain

Once the authority and the need has been agreed and the information released, the next problem facing the centre is to decide whether the recipient may retain it, and if so, for how long.

3.4.1 Need-to-Retain by On-Site Users

This may be a routine matter when documents are issued internally, as establishment guidelines would state clearly the policy to be followed. However, the requirements of internal borrowers do change, and it is good security practice to ensure that holdings are reviewed regularly. An unused document can become a forgotten one, and once forgotten, an item is at risk. Any review might be made at the time of mustering (see paragraph 5.4.1), and this is a useful policy. However, some agencies may require their employees to certify at regular intervals their need to retain each document. This system, although it has obvious security advantages, involves the centre in a considerable amount of effort and is likely to be unpopular with borrowers.

3.4.2 Need-to-Retain by External Borrowers

It may be necessary to apply stricter controls to retention of information by external organizations. Some countries, for example, use security inspectors to ensure that documents issued to contractors are destroyed or returned to the originator when the contract has expired. Another method is for the contract manager or technical officer to decide which documents may be retained.

Writing as a recipient of such documents, Berry[10] argues that as long as the facility retains its overall security clearance it should only be required to reduce to the absolute minimum the classified material on hand upon termination of the contract. He further suggests, that approval should not be required for the contractor to retain a limited number of all classified documents generated, unless strictly prohibited by the contract manager in special circumstances.

3.5 Need-to-Copy

If the centre is to maintain adequate control over the documents it records and issues, it must know always the situation concerning all copies of a particular document. It is important therefore that individuals should not be allowed to make copies of classified publications held. The documentation centre should be the only part of the organization permitted to reproduce them.

Difficulties may occur if the centre does not control the reprographic activity, but it should nevertheless remain its responsibility to authorise any copying of documents or of extract pages. Security requirements to be observed during the various copying processes are described in paragraph 4.5.

If the centre wishes to make copies of classified documents received from other originators it will have to ensure that the terms of issue allow this. Furthermore, there may well be copyright or proprietary restrictions which will need to be considered. It is therefore preferred, and in many cases mandatory, that the originating authority be asked to approve further copying.

3.6 Conditions of Release

Although this subject is discussed in Section 8 of this Manual, it is so closely allied to need-to-know that it must be mentioned here.

It is to the advantage of all if the terms under which information is released are made clear to the recipient at the outset. The points which will need to be considered include:

- May the information be further disseminated, for example to sub contractors?
- May the document be copied?
- What proprietary or patents rights are involved?
- How may the information be used?
- How must the document be protected?
- Are there any legal or statutory obligations?

If military information is involved and is being released on a Government-to-Government basis, it is perhaps even more important that conditions of release are stated by the issuing body, and that they are fully understood and respected by the recipient. Some countries use specially prepared conditions of release stamps in standard format. These stamps may for example be used to indicate:

- Whether the information may be released to a third country.
- Whether the recipient Government may make the information available to its defence contractors.
- Whether the originating Government has any proprietary rights.

3.7 Release Procedures

Release procedures in each country will vary considerably and will depend so much on circumstances that is difficult to define standard methods. Furthermore they will mostly be determined by higher policy authorities, and the centre may not be involved in their formulation or implementation.

The procedures devised will of course have to take into account all of the matters discussed in paragraphs 3.2 to 3.4 but additionally will need to consider any special requirements for transmitting the information. A typical but simplified release procedure is described below.

- The originator of the document indicates that there is no objection to the release.
- The technical policy authority confirms that the information may be released.
- The responsible body indicates that there is an authority to receive the information.
- A special section examines the document for information of commercial value.
- The document is then passed to the section responsible for issuing it, and it is transmitted through the agreed channels, and in a safe and secure manner.

4. PHYSICAL SECURITY

4.1 Filing and Storage

There are three major considerations concerned with filing and storage. The first is whether to separate geographically, unclassified from sensitive documents, the second is to decide on the filing equipment required and the third is the method of arranging the publications on the shelves in the centre. See also paragraph 1.3.

4.1.1 Layout of the Documentation Centre

The fundamental decision to be taken is whether to store all documentation together, or to provide separate storage areas for classified and unclassified documents. The decision reached may well depend on the existing physical layout of the areas assigned to the centre, on the overall size of the collection, and perhaps more importantly on the relative number of unclassified and classified publications held.

If a single series filing policy is adopted it means that all documents must be given the protection required for those with the highest classification, and will result in a larger secure area being required. However, administratively, the method has some advantages. Handling and control may be easier if all documents are together, the risk of filing returned documents in the wrong area is reduced, and the problems of transferring regraded publications from one area to another area eliminated. The question of whether to file reports literature separately is discussed at length by Herner and Heatwole[11] and consideration is given to both security and general organizational aspects.

4.1.2 Filing Systems

There are two major problems to be considered when deciding how to store publications. The first is the sheer volume and bulk of the collection, the second is the varying formats in which documents are produced. A documentation centre may need to file paper copies in an assortment of paper sizes and varying in thickness from single sheets to large bound volumes, as well as microfilm reels, microfiche and aperture cards. Filing systems for paper copies and for microforms are considered separately.

(a) Filing of Paper Copies

There are many filing systems available for storing paper copies, ranging from simple cupboards to very sophisticated and expensive equipment. Many large collections are housed on metal or wooden shelves in fixed racks, and Herner[12] concludes that this system is the most efficient and economical in terms of storage space. Several forms of movable racking are also available, and their use can increase greatly the storage capacity of a particular area. Sliding or rolling shelving may be costly to install, but can assist in security control because some of the systems allow for the solid end of a rack to be locked, thus denying access to the shelves. The major disadvantage with rolling shelving is that only a limited number of bays can be accessed at the same time. Furthermore the floor must be capable of withstanding very heavy loading. See also paragrahs 3.5.1 Section 11 of this manual.

Walkins[13] has described the various methods of filing reports, such as pamphlet boxes, binding, and vertical filing. Jackson[14] not only discusses the problems, but provides a list of products and manufacturers. However the most comprehensive treatment of the subjects is probably provided by Collison[15].

(b) Filing of Microforms

The most common form of microformat for documents is microfiche in a standard 148 x 105 mm size. The advantage of this form is that the microfiche may be placed in special wallets and filed in index drawers each of which can contain up to 500 microfiche. If only a few microfiche are held it is possible to purchase special A4 size fiche panels which hold twelve fiche per side and can be contained in loose leaf binders. Documentation

centres holding a very large number of microfiche may well consider obtaining an automated filing and retrieval system, which consists of index drawers in a rotating conveyor system. The required shelf can then be selected automatically by the operator.

Other microformats are not so convenient to store. Perhaps the most difficult to handle are cans of microfilm particularly if they are held in various sizes. One method is to store them flat on shelves, but this is not economical in storage space and makes it difficult to access those at the bottom of the stack. An alternative is to transfer such reels of microfilm to microfiche jackets which are a similar size to microfiche. This will assist in uniformity of handling, but its implementation depends on the availability of equipment such as jacket fillers and microfiche duplicators.

4.2 Store Room Security

It is one of the fundamentals of security that documents requiring protection must be stored in appropriate secure accommodation and must not be left unattended or accessible at any time. This requirement means that during business hours the management of the centre will have to ensure that only authorized officers are allowed access to the stock. The need will have to be considered when the physical layout of the centre is planned, and a control point should be sited strategically so that all visitors have to report to it, and cannot enter the centre unseen. At the end of each day it must be ensured that the area is secured during "silent hours", and the staff involved should be aware of the locking-up procedures. It may be necessary to install an alarm system to windows, walls and doors.

The physical security requirements of the Centre will depend on its geographical position within the facility. Some documentation centres, for example, may be situated in isolated buildings, others will be surrounded by other offices. The Security Section of the organization will advise on the detailed safeguards required, but in principle the centre should be capable of withstanding unauthorized access.

The rapid growth of reports literature may require the centre to seek overflow accommodation which may be remote from the main area. It should be noted that if this extra storage houses classified material, then it will require the same standard of physical security as the main documentation centre.

4.3 Security of Catalogues

Most centres will provide comprehensive catalogues or indexes to their collections. It is advisable that a record card should include not only the security grading of the document that it indexes, but that of the record itself. A decision will then need to be taken about the security classification of the total catalogue, and access to it will be governed by the level decided.

Some organizations do not permit users to consult the record files without the presence of a member of the centre's staff, others accept that some level of browsing through indexes is unavoidable. A compromise to these alternatives is suggested by Gerrard and Lyle[16]. They describe a system in which the indexes are searched firstly by the information staff, and then the borrower is presented with a selection of record cards for screening and selection.

4.4 Security of Microforms

Specific aspects of handling microforms, are considered throughout this section in the appropriate paragraphs. This paragraph is concerned solely with physical security considerations.

Orne[17] has estimated that the efficient use of microfilming can result in a 90% reduction in space requirements. (See also paragraph 5.2.2 Section 9 Vol III of this manual). This advantage has resulted in many centres turning to this format for their collections, but by their very nature microforms pose security and handling problems.

Rolls of microfilm containing a number of documents are particularly difficult to control. Consideration should be given to the following when devising a security system:-

- The fact that each roll may contain items of different security classifications.
- The difficulties of access by users who may wish to see one document on a reel, but may not have an authority or need to view the remainder.
- The problem of downgrading specific sections of the roll.

Because of these drawbacks many centres use microfiche for storage pruposes. Depending on the standard used each fiche holds either 60 or 98 frames, and contains a heading strip which can be read by the naked eye. If the document has a security grading this should form a part of the "eye readable" strip. As an added assistance in recognizing a classified microfiche it may be possible to use some form of colour coding. Several alternatives are available:-

- The envelope containing the fiche, or the descriptive lettering on it may be of the appropriate colour.
- The fiche itself may contain a coloured strip either along the edges or across the heading. Such microfiche stock is available commercially, but care should be taken when selecting this material. Some of the colour strips available are not opaque and therefore the wording on them will not reproduce when the fiche is duplicated.

Because of the size of microfiche copies and the ease with which they can be mislaid borrowers will need to exercise particular care when handling documents in this form. Centres may be able to reduce the risk by issuing microfiche inserted in A4 size folders of the appropriate colour. An added advantage of this method is that the security and handling regulations can be printed on the binder, and that borrowers will be able to store paper copies and microfiche together with a minimum of inconvenience.

4.5 Security in Reprographic Rooms

Security and control during reprographic and printing processes is vital, and the standards of protection described throughout this section of the Manual are equally applicable. There are three basic considerations:–

- Security of personnel employed in the reprographic areas.
- Security of the room, and the equipment and machinery located there.
- Security of the documentation.

4.5.1 Security of Personnel

The first principle is that all staff handling classified documents during processing must be authorized to do so. Personnel security may be improved if a policy of "dual control" is followed. This system demands that all classified paperwork is kept under lock and key unless there are at least two people present, and that copying and printing of classified work is similarly controlled. As an added safeguard it may be desirable to ensure that all machinery has a double locking system, so that it can only be operated when two persons are in attendance.

4.5.2 Physical Security of the Reprographic Room

Many reprographic installations which print classified material, limit access to those persons who work in the area, and will operate a controlling point to which all visitors must report. During "silent hours" the considerations described in paragraph 4.2 will apply, but as an added precaution it may be possible to immobilize the equipment, either by removing part of the apparatus or by locking all power sources.

4.5.3 Documentation Security

Strict control of all paperwork must be maintained at all stages of the production process. Special care must be taken to meet security standards such as those described in paragraph 5.1.1, but the following points should also be considered.

- The master material should be recorded immediately upon receipt.
- All subsequent movements should be monitored.
- Care should be taken to ensure that all copies are destroyed under controlled circumstances (see paragraph 6.6).
- All stencils, plates etc containing classified information should be protected.
- Staff must be aware at all times of their responsibilities and management should provide adequate written instructions.

4.6 Security in Computer Rooms

This section does not seek to discuss the questions of computer privacy, or any of the moral aspects of access to personal information. These matters have been dealt with at great length elsewhere, and it is intended to concentrate entirely here on the physical requirement of the computer room, of the terminals and of the security procedures for people having access to these areas.

Regulations controlling access of visitors will vary from organization to organization but Finney[18] describing the mechanics of the Defense Documentation Centre (now DTIC) On-Line Facility details the security requirements for visitors to the terminal. These are typical of many organizations and may be summarized as follows:–

- Every visitor must have a visit clearance letter filed in the office in advance of the visit.
- The identity of all visitors is carefully checked.
- All organizations must be entered in the Fields of Interest Register, and searches may be conducted only within that registered field of interest.
- Visitors may not make written notes at the terminal.
- No print outs of classified data may be made.
- The terminal is controlled by log-in and log-out procedures which must coincide with the computer generated log.

Some centres may operate on-line information retrieval facilities which are made available to more than one site or organization. It is imperative that any classified information or programs entered on such a system are kept to an

absolute minimum. Peters[19] has listed some of the safeguards required when the inclusion of classified information is unavoidable. These may be summarized as follows:–

- The computer itself must be managed in a controlled and secure manner.
- Steps should be taken to ensure that appropriate proprietary or contractual arrangements are made so that the computer is effectively under the control of the parent organization.
- Renting time on a main frame owned by a third party can never be secure.
- Engineering and maintenance personnel should be security cleared.
- It is essential that the system has a secure monitor.
- An appropriate work space which has been suitably cleared for classified work must be provided.
- The operator's comfort must be taken into account (e.g. if he is too hot he may leave the door open!)
- Operating instructions should be clear and unambiguous.
- Responsibilities should be defined clearly.
- Daily spot checks should be carried out to ensure that security requirements are being met.
- The chain of command should be strong and unambiguous but should be within the jurisdiction of one organization.

Scoma[20] has outlined management responsibilities in planning or redesigning a computer complex. These can be described briefly as:–

- Plan the facility in advance, taking as much time as possible.
- Review regularly any existing facility taking into account any changes in requirements.
- Each complex will have its own security requirements. Plan for those requirements and do not copy other facilities.
- All employees should be trained in fire reporting as well as fire fighting procedures.
- Provide adequate back-up facilities for power and air conditioning services.

4.7 Security of Library Equipment

Many centres will possess items such as photocopying machines, microfilm reader printers and microfiche duplicators, and all of this equipment will require protection and control. It may be desirable to nominate specific members of staff who are permitted to use these machines, and as an added precaution the "dual control" described in paragraph 4.5.1 may be used.

Some centres will own equipment such as tape typewriters or word processors and the Security Section of the organization will advise on the best siting for these machines and on any electronic security requirements.

4.8 Security against Environmental Factors

When the physical layout of the centre is planned, consideration should be given to the comfort and safety of the staff, as well as protection of the stock against environmental extremes.

The site chosen for the centre should be free from damp or moisture, and maintained at a reasonably steady moderate temperature. Furthermore paper documents should be stored away from direct sunlight, and microfilm should be stored in containers which are reasonably airtight and free from dust. If diazo copies of microfiche are stored in paper envelopes care should be taken when selecting the material used to ensure that these wallets are free from mechanical wood pulp as this can be deleterious to the fiche stock.

Staff should be educated in fire reporting and evacuation procedures, and the centre should possess extinguishers which are capable of fighting both paper and electrical fires.

Particular care should be taken to ensure the safety of valuable or unique items for which the centre has an archival responsibility. A fire or other disaster could destroy these irretrievably. Therefore it is advisable that a duplicate set of these documents is maintained either in hard copy or microfilm, at a site well away from the main area.

5. CONTROL OF MOVEMENTS OF DOCUMENTS

5.1 Processing of Documents

In order to make its stock available to users, the centre will need to process incoming documents. The treatment may include such procedures as accessioning, subject indexing, keywording, abstracting, preparation of records, marking of documents, filing of record cards and announcements. Many of the techniques are described elsewhere in this Manual, and this section is concerned solely with control and security aspects during these processes.

In addition to newly received material, many centres are responsible for processing, through their draft and reprographic stages, reports produced by the parent organization. This section deals separately with the two types of document.

5.1.1 Processing of Draft Documents

It is important that guidelines be written for the processing of such documents, so that everyone involved knows exactly what is required of them. A suggested progress method is given below but it should not be followed totally without assessing its relevance to the particular requirements of an organization. A draft may undergo all or some of the following stages:–

- An author writes a report, and allocates security gradings and other markings (see paragraph 2.1).
- The author's senior officer approves the technical content, confirms the security gradings and decides upon the distribution.
- The security officer checks the draft to ensure it meets security standards, that security markings are clear, and that those on the distribution list are entitled to see the document.
- The editor (who may well be a member of the documentation centre) checks to ensure that the draft meets the laid-down house style, that it is grammatically correct, and that all diagrams, figures and appendices are present. The editor may also be responsible for technical editing.
- The draft passes to the person responsible for progressing its preparation.
- The draft passes to the sections who will prepare it, e.g. text to the typing pool, figures to the drawing office, photographic negatives to the photographic section, and covers to the graphics section.
- The prepared text, figures etc are returned to the author for checking and final correction.
- Corrections are made and a single copy printed.
- The copy is passed to the person responsible for approving issue so that the promulgation page may be signed.
- The required number of copies are printed, collated and bound (see paragraph 4.5 for security requirements during the reprographic process).
- Copies are passed to the documentation centre for distribution or filing.
- The master material is stored.

During its progress a draft will undergo many movements and control may not be easy to maintain. The following may be the most important points to bear in mind when devising a procedure.

- All movements of the draft and portions of the draft should be monitored carefully.
- The security classification of the draft should be marked clearly on each page.
- A process form might usefully accompany the document to record progress. (Figure 2 shows an example of such a form.)
- During the draft stage there may be several copies in existence at any one time e.g. author's manuscript, typescript and the carbon copy. The whereabouts of each must be known at all times.
- Destruction of the draft or spoiled copies should be recorded and certified.
- Portions of the draft may become separated during processing, and each page, figure etc will have to be accounted for at all times.
- Staff handling the draft must be aware of their responsibilities, and should know the security grading of the documents, and preferably its derivative classifications (e.g. grading of the title and abstract in isolation).

5.1.2 Preparation of Documents for Issue

The processes through which a document passes will vary according to the functions of the centre, but control during processing should be no less stringent than normal security requirements. From a security viewpoint centre staff may need to take the following into consideration:–

- An immediate outline record of receipts should be made.
- The document should be easy to locate at any stage of the processing.
- Staff handling the documents should be authorized to do so.
- Care should be taken to ensure that any classified records made by the centre are marked appropriately.
- Any restrictions imposed by the originator or sender should be honoured. Such instructions might include "Not to be included in accessions bulletin."
- If the report has been received as the result of a specific request, it should be checked that the requestor still retains his authority to receive.
- The document should be physically securing during processing, and access should not be given at this stage to unauthorized staff.

– The document should be checked to ensure that it will not cause problems at a later stage. The questions to be answered include: Is it securely bound? Is it complete? Are the security classifications clear and fully understood?

5.2 Security During Transmission

Once a document has been processed it can be made available for issue subject to any existing security restrictions. Various methods of ensuring safe transit are available, and each organization will set its own particular standards. (See also Appendix B, Section 2 of Vol I of this Manual). Issues to internal borrowers and to external recipients are considered separately.

5.2.1 Transmission to On-Site Borrowers

The policy adopted may well depend upon the number of likely clients and upon the size of the organization being served. In a small establishment issuing a limited number of classified documents to a compact site, it may be desirable to stipulate that all issues and returns must be "over the counter" transactions, and that the borrower must visit the centre for this purpose.

This is unlikely to be practical in most circumstances, and if the policy of the establishment is to insist upon hand to hand issue and return, a possible alternative is to employ a special messenger to undertake these duties. This system has the advantage that strict control can be maintained at all times during transit and that evidence of receipt is easy to obtain. It has the added benefit that documents in demand will not be delayed in in-trays waiting for the borrower to return from leave, and that recipients cannot deny knowledge of the delivery of the item. The method's main disadvantages are that it is costly and time consuming.

If the above methods are not considered feasible the alternative remains to issue documents through the organization's own internal transit system. This is the cheapest and probably the most straightforward way, but control of the document may be tenuous and proof of receipt may be difficult to obtain.

5.2.2 Transmission to External Borrowers

If a document is to be issued outside the parent organization, it may be more difficult to ensure complete control during transmission. It is probable in such cases that the procedures will be defined strictly by national security regulations, and will have to be followed rigidly by the centre. Suffice it to say that the alternatives available include delivery by private delivery services, by courier or by normal postal services. The system adopted in each case will be dictated by the security classification of the item and perhaps by the intended recipient. The centre will need to ensure that the item is securely packed, that it is correctly addressed, and that the recipient confirms receipt as soon as possible.

5.3 Issuing Systems and Circulation Control

One of the fundamental bases of good document security is control of items at all times, and this must include suitable issuing systems and circulation control. Buckland and Gallivan[21] have summarised the qualities of a document circulation system suitable for most types of libraries as follows:–

– To link document, and borrower information speedily and accurately.
– To enable the issue records to be consulted easily.
– To handle the return of documents required by other borrowers.
– To prepare overdue notices.
– To provide lists of documents on issue to specific borrowers.
– To pinpoint "problem" borrowers at the point of issue.
– To enable statistical information to be available.

A different emphasis however must be placed on the requirements of a centre which handles a large amount of classified or distribution controlled documents. Sims[22] has outlined the information which may be required from a system which issues classified reports. These might be outlined as follows:–

– Record all issues.
– Record all Returns.
– Provide receipts as required.
– Indicate which documents are held by specific borrowers.
– Indicate the whereabouts of a specific document or copy of a document.
– Indicate when and for what periods a document has been borrowed (i.e. provide a history of a document).
– Indicate which documents any borrower has borrowed and returned (i.e. provide a history of a borrower).
– Indicate which documents or copies of documents have been removed from the system e.g. for destruction.

	Date	Signature	Remarks
A) Head of Division (to approve technical content and agree security classifications)			
B) Security Officer (to approve distribution)			
C) Editor (to allocate Acc No and UDC No, and edit draft)			
D) Typing and Production Section			
E) Author (to check typist's proof copy and to attach covering letter if applicable). NB corrections must be made at this stage			
F) Print Room (to print)			
G) Author (to approve final proof copy)			
H) Delete as appropriate			
i) Director (to sign Establishment Reports to approve issue and distribution and to sign covering letter)			
ii) Head of Department (to authorize Technical Notes)			
iii) Head of Division (to authorize Div Notes)			
iv) Head of Military Section (to authorize Acceptance Trial Reports)			
I) Production Section to collate and bind			
J) Reports Section (to issue and distribute)			

Fig.2 Example of processing form for draft reports

12. INTERNAL DISTRIBUTION (*NAMES* AND SHORT TITLES)

13. EXTERNAL DISTRIBUTION UK

14. EXTERNAL DISTRIBUTION ABROAD

Release Stamp

USA A B C D

Canada A B C D

Australia A B C D

New Zealand A B C D

15. EXTERNAL DISTRIBUTION ABROAD. OTHER DISTRIBUTION
(Please add release stamp)

16. SPECIAL INSTRUCTIONS

Fig.2 Example of processing form for draft reports (continued)

- Indicate which documents have been issued and are overdue.
- Provide recall notices as appropriate.
- Indicate which reports have waiting lists.
- Indicate who is waiting to see a particular document.
- Indicate which documents should be considered for downgrading and declassification.
- Provide a directory of potential borrowers and indicate their entitlements and particularly any limitations to their access.
- Provide stock control information and particularly indicate how many and which copies are on the shelves at any particular time.

5.3.1 Manual Systems

Any system devised will need to ensure that the previously described requirements are met. A typical system for achieving this is described below, but there are many variations and this example should not be followed slavishly without taking into account local requirements and considerations.

One possible issuing method utilises a master record card for each document. Every transaction is marked on that record and in this way details are retained permanently of all movements of every item. At the time of issue a four part record is completed giving details of the transaction. The top copy is issued as a receipt and is filed under the borrower's name after signature. Two further copies are filed in date order and are used as hastening notices. When the document is returned the borrower is given the receipt in exchange, and the bottom copy retained under the borrower's name as a permanent record.

Like many manual systems the above method is fairly simple to operate in principle, but may be time consuming when a heavy work load is involved. Furthermore such procedures may not be capable of giving readily all the information required in managing a classified document system, and written records tend to become unclear and ambiguous over a long period. Therefore some organizations have investigated the advantages of computerising their routines.

5.3.2 Automated Systems

Tedd[23] has described in detail several computerised systems which have been devised for the issue and control of documents. Most of these are intended for use by University or Public Libraries and may not be suitable for fulfilling all the requirements outlined in this chapter, but it may be possible to consider them for adaptation.

Eunson[24] has outlined an on-line system which was specifically designed for the circulation of reports including classified documents, and describes in detail the problems faced and various methods of overcoming them. Briefly the system allows for:–

- Work on the loans file i.e. entry of new loans, deletions, extensions etc.
- Printing of recall notices for overdue items.
- Listing of overdue loans which may require special action.
- Listing of all items in the files.
- Provision of an archival catalogue file which is used to record deleted loans.

Berlin[25] has described an automated system which was specifically designed to cope with the requirements of controlling classified documents originated by or received from government agencies and contractors. This Research Analysis Corporation "Classified Document Control System" was created as a complete system to enable the organization to maintain full control for locating documents, have as few forms as practical, and include a capability for an automatic notification of downgrading. This system, although it handles some 400 transactions daily can be operated by only two staff.

5.4 Handling and Custody of Documents by Borrowers

Once the centre has issued a report, the responsibility for its secure handling and storage passes to the organization or individual who has taken custody. Whilst overall security regulations are usually formulated outside the centre, it will be involved in their administration and implementation. It is also likely that the system used for handling general papers, correspondence etc, will not be suitable for the material handled by the documentation centre.

The regulations formulated will need to inform potential borrowers of the following aspects:–

- How to obtain a classified report.
- What constitutes a classified report.
- How to recognize a document issued by the centre.

- How to handle and store classified reports.
- How to return classified documents to the centre when no longer required.
- Where to return them if there is more than one issuing point.
- When to return them.

The regulations will naturally vary from organization to organization, but the following is a typical code of practice:–

- A document is issued on the personal charge of the person who accepted its custody. It must not be passed to any other person without the prior knowledge and authority of the documentation centre.
- Documents on charge are not to be 'pooled' within a section or group.
- Documents on charge must not be destroyed.
- Documents to be issued outside the organization must be channelled through the documentation centre.
- Photocopying of documents, or of extracts therefrom must be arranged by the centre.
- Documents on charge from the documentation centre must not be placed in files etc.
- Holders must make documents on their charge available for spot check or muster.
- Documents which are sent to holders by outside organizations must be sent to the documentation centre for recording.
- Issue of documents to on-site representatives of other organizations must be arranged through the documentation centre.

When a borrower holds a document he must be aware of its sensitivity and know how to handle it. It is therefore imperative that he is aware of the code of practice. Many of the problems caused to the documentation centre by 'lost' documents are not the result of sinister actions, but are caused by user staff who have failed to abide by the rules or profess ignorance of the regulations. Education of borrowers and potential borrowers is therefore a matter of prime importance. The teaching programme may well be the responsibility of the Security Office, but the documentation centre will almost certainly have an important part to play.

Every effort should be made to bring the regulations to the attention of staff, and the following are some of the ways in which this can be done:–

- During any introductory lecture giving guidance on the facilities of the centre.
- In any written formal guides to the services of the documentation centre.
- In the organization's Security Manual.
- In a Library or formal Organization memo which might usefully be reissued at regular intervals.
- By inclusion of a synopsis of the regulations on each report as it is issued. This might well appear on the reverse of a specially prepared covering note or circulation sheet. The use of such a sheet also aids the borrower in recognizing easily a document issued by the centre.

5.4.1 Mustering

It will be necessary from time to time (preferably not more frequently than once each year) to ensure that a borrower still has in his possession all documents on his charge. This can be done in one of several ways, and the amount of effort required by the documentation centre will depend on the method adopted. The systems available include:–

- Return of all documents to the centre for checking and reissue if required. The advantages of this method are that the checking work can be done within the centre, that there can be no doubts or ambiguity about the reports held, and that the borrower may well be encouraged to review his holdings and only ask for the reissue of items of immediate interest. The disadvantages are that it will involve a great deal of effort in the documentation centre, that a borrower will have to release his documents for a period, and that it may well create some user resistance.
- Self muster by the borrower. With this method the centre will provide details of the documents held, and the borrower will certify that they are still in his possession. A typical self muster form is shown in Figure 3. The main advantage of this method is that the preparation work can be carried out in the documentation centre. There are serious disadvantages in that the certification is not verified by a disinterested party, and that the borrower will only look for the items listed. The method will not therefore muster reports which the borrower has acquired 'illegally'. In addition it may be difficult to persuade borrowers to return the certified lists.
- Personal muster by documentation centre staff. Using this method the mustering team will visit the borrower with a list of the documents, personally sight all has holdings and certify that they are all correct. The advantages of this system are that the findings will be verified and are unambiguous, that the borrower will not be badly inconvenienced, that there is little preparation work involved, and that any irregularities in the borrower's handling of his reports may well become evident. The major disadvantage is that the check cannot be carried out in the centre, and that it will be time consuming for the mustering team.

LIBRARY AND INFORMATION SERVICES

CHECK OF CLASSIFIED REPORTS HOLDINGS

To:– From:–

Division:–

Room:–

The classified reports listed below and overleaf are on charge to you from the Reports Section and signed receipts are held.

Would you please confirm that you have these reports in your possession, and return this list within three weeks to the Library with the attached declaration duly signed.

If you are unable to find any of these documents, you should report the matter immediately to the Head of Library.

Head of Library and
Information Services

Acc No	Title	Originator	Security	Date Issued

To Library:–

I have checked my holdings of classified reports against the above list and confirm that the documents listed are still in my possession and are available for inspection if required.

NAME:– DIVISION:–

SIGNED:– DATE:–

Fig.3 Typical layout of form for self-muster

5.4.2 Spot Checking

In addition to routine mustering it will be necessary for spot checking of classified documents to be carried out. The fundamental principles of spot checks are that they should be random, unexpected, and conscientously carried out from start to finish. Usually only a small selection of each borrowers holdings will be spot checked at any one time. It should also be noted that any loose leaf document being spot checked should be checked to see that all pages are present, and that all amendments have been inserted correctly.

Any microfiche jackets held should be checked against an original to ensure that all pages are present.

6. HOUSEKEEPING

6.1 Downgrading

A document is downgraded when its existing security classification is replaced by a marking of a lower classification. It is broadly true to say that the higher a document is classified, the more stringent are the controls and handling required. It follows therefore that it is beneficial to the centre, in terms of staff effort and consequently in cost effectiveness, if documents can be retained at the lowest possible classification and downgraded at the earliest opportunity. Furthermore it allows for greater care to be taken with those reports which must remain classified. The centre should therefore make every attempt to initiate downgradings where appropriate.

In the United States of America an automatic downgrading system operates, and a report is allocated a particular category which indicates if and when it may be considered for downgrading. This "time-phased" system of downgrading has been described in detail by Rea[26]. He quotes as an example a document which is downgraded automatically from Secret to Confidential after three years, and from Confidential to Unclassified after a further nine years.

Buckland[27] describes the issues to be considered when initiating a downgrading policy, and Campbell[28] has detailed some of the difficulties experienced by user libraries when attempting to comply with automatic downgrading instructions.

Most other countries do not operate such automatic downgrading systems, and therefore other methods must be found to initiate any review of security classification and subsequent downgrading.

The decision on downgrading will usually be made by the originating agency, but the method will vary from country to country. The mechanics are not usually the concern of the documentation centre which will be involved only in the results of any decision. Downgrading responsibility is given normally to an officer of at least equivalent rank to the person who allocated the original classification, and some agencies do not consider that the author is a suitable person to decide alone upon downgrading his own documents.

In cases when the initiative is not taken by the technical authority the centre may wish to take action. Some of the ways this can be done are:–

- To ask the author or senior authorizing officer at the issuing stage to detail the current classification and to indicate at what stage the document might be considered for downgrading. A typical form which might be used for this purpose is shown as Figure 4.
- To raise automatically at regular intervals the question of downgrading of each document. This would place a heavy burden on the centre particularly in organizations having a large output of reports. A form which might be used for routine downgrading is shown in Figure 5.
- To organize a Downgrading Committee. This committee might consist of members of the originating and other technical departments, together with a representative of the documentation centre who might well act as Secretary to the Committee. This system is known to operate in several establishments, and has the advantage that scientific personnel are obliged to consider actively the matter of security downgrading. The main drawback is that the larger the committee the more likely it is that disagreements will occur.
- To consider downgradings on an ad hoc basis, as the opportunity arises. Such occasions may occur when a request is received to release an old document. Additionally when a member of the establishment retires he may be asked to review the classifications of the documents he has written, and to recommend to senior management any downgradings.
- To organize special exercises from time to time to consider downgradings in particular subject areas. It may be possible to employ the services of a recently retired subject specialist to undertake the task.

Once a decision has been made to downgrade a document, and the centre has been informed various actions will have to be taken as follows:–

– All shelf copies should be marked clearly and unambiguously with the new marking. A reference to the authority for downgrading should be made also.

Classification of this form (when completed) .....

GRADING OF R & D REPORTS

A Report No ..... Title .....

.....

B CLASSIFICATION OR MARKING RECOMMENDED (Tick as appropriate)

	Title	Abstract	Report
Top Secret			
Secret			
Confidential			
Restricted			
Unclassified			
Unlimited*			
Commercial in Confidence			
Other Markings or Caveats			

C Factors affecting the present classification or marking (or any subsequent lower marking) if not 'Unlimited' to be given in the box below, eg security grading lists, classification of references, new research developments, concepts etc, proprietary or commercial information. (Please indicate page numbers containing sensitive information where possible.)

D This report may be reviewed for possible downgrading in ..... month .....year.

Signed ..... Date .....

Establishment .....

E Technical policy authority approval

Signed ..... Date .....

Branch .....

(Other policy authorities consulted) .....

Fig.4 Typical form for grading and downgrading of documents

From Reports Section

To

DOWNGRADING OF REPORTS

It is requested that consideration be given to the downgrading of the undermentioned report and the result indicated below.

Head of Library and
Information Services

Report Acc No _____ Ref _____

Title _____

_____

_____

Author _____

Date of Publication _____

Present Classification _____

To Reports Section

The above mentioned report may:–

* be downgraded to _____

* not be downgraded at present.

Signature _____

Date _____

* Delete as appropriate

Fig.5 Typical layout of form for routine downgrading

- All references to the documents such as catalogue cards, index entries etc, should be amended accordingly.
- All holders of the report should be informed, and asked either to amend their copy or to return it to the centre for remarking. The system to be used will be a policy decision taken by each individual establishment.

6.2 Regrading

Occasionally it may be necessary to amend the security classification of a document without downgrading it. This may involve either the addition of special marking, or in rare circumstances may result in a higher classification.

Once a decision on regrading has been made, the centre will need to amend copies and records as described in paragraph 6.1. All holders will have to be informed as a matter of urgency, and may be asked to certify that the handling or further distribution of the report has in no way compromised its new grading.

6.3 Declassification

The final stage in downgrading occurs when the report becomes completely unclassified, and all distribution restrictions are removed. This may be denoted by marking the document with a statement such as "This document has been approved for public release and sale: its distribution is unlimited."

In some countries statutory obligations are placed on issuing agencies to declassify items after a certain period of time, unless they can give specific reasons why this should not be done. In the United Kingdom, for example, there is a 30 year rule and originators are expected to make documents available to the Public Record Office.

Van Cook[29] has outlined a typical declassification policy. The main points are:

- Timetables for declassification to range from 6 to 10 years.
- Exemptions from automatic declassification must fall into one of four specifically defined categories.
- Documents exempted from automatic declassification to be subject to mandatory review after 10 years.
- Information remaining classified after 30 years to be declassified automatically unless the Head of the Originating Department certifies in writing that it still requires protection.
- Sanctions to be imposed on those who abuse the system.

6.4 Reviewing and Weeding

One of the major problems which faces all types of documentation centres is shortage of space. Shelving, storage areas and particularly secure storage are expensive facilities. The costs of storing classified documents have been described in detail by Richardson[30].

It is important therefore that the centre seeks ways of ensuring that the accommodation allocated to its staff, to its equipment and to its stock is used efficiently. It is also true in general that the larger the collection, the greater the difficulties involved in handling and control. Therefore it is good library and security practice to ensure that every document held is worth its place on the shelf, and that any duplicate copies held are essential.

Physical methods of making space available e.g. by the use of mobile shelving, by microfilming or by the use of overflow storage areas are described in paragraph 4. This section is concerned only with the processes of reviewing stock and discarding unwanted items.

Review and withdrawal of stock can be carried out as follows:–

- At the time the documents are received.
- At regular intervals during the life of a document until only a single copy remains. This will raise the question of whether the last copy may be issued.

6.4.1 Reviewing and Weeding on Receipt

It is inevitable that most centres will receive material that is outside its subject area, or is of doubtful value. Furthermore individuals within the organization are likely to deposit large quantities of documents which they have collected over the years and no longer require. If the centre is not to become simply a home for other people's discards it is important to examine critically documents received, and to formulate at the input stage, a retention policy.

The various aspects of this type of reviewing method, as they might affect a National Documentation Centre have been described by Holloway[31]. The recommendations include:–

- Dispose of documents which are available in quantity elsewhere.

- Consider the possibility of only partially processing documents which are of doubtful value and then discarding them if they are not requested. The processing would enable the publication to be identified and retrieved if required, but would avoid such costly procedures as indexing and abstracting.
- Examine closely the number of copies received, and return excess copies to the sender.

6.4.2 Reviewing and Weeding of Existing Stock

Unless a document collection is reviewed regularly it will outgrow even the most extensive accommodation. It is therefore of great importance to organize a withdrawal policy which can be operated to some extent on a routine basis. A typical policy for reports written by one's own organization might involve retaining all copies for one year, reducing this to a maximum of five copies until the fourth year, to three copies after the seventh year and finally to one copy at ten years. The policy for retaining copies of reports written by other organizations will almost invariably be less strict than for in-house reports.

Although such a scheme has the advantage that it can be operated as a clerical exercise, it does have the inherent danger that special circumstances will not be taken into account. This may result occasionally in the removal and destruction of important or even unique documents. It is therefore desirable that any such destruction policy should be supported by a more searching appraisal of the stock and retention requirements. Such a scrutiny might take all or some of the following points into account:–

- Overall Space Considerations. This may seem an obvious element, but it is a fact that the tighter the storage space available the more stringent must be the discarding criteria.
- Demand for the Document Over the Past Year. When deciding upon this aspect consideration should be given to any special circumstances which may have resulted in an artificially high or low demand.
- Any Statutory or Legal Requirements. Some libraries may have an obligation to retain at least one copy of all documents produced by a particular organization. There may also be a requirement to offer all unclassified documents to a central organization which has an obligation to retain documents and make them available to the public. It should also be noted that there may be instructions forbidding the destruction of reports originated by other organizations.
- The Possibility of Obtaining Other Copies. Difficult to obtain documents may require a special handling and retention policy. Less stringent retention criteria might be applied to items that are easily obtained. Some for example may have been reissued in commercial journals.
- Possibility of Photocopying. Documents containing a large number of photographs or difficult to reproduce diagrams should perhaps be retained in larger quantities than those containing only pages of easily copied text.
- Relevance of Subject Area. Over a number of years the subject interest of an organization might vary, and items no longer of interest may well be withdrawn.
- Out of Date Information. Obsolescent material may be discarded although care should be taken at all times. It may be advisable to retain a copy of all in-house documents even though the information may be obsolete or a later edition published. Any archival responsibilities that the documentation centre may have, should also be taken into account.
- Interim Information. It may be decided that progress reports may be discarded once the final report has been received.

6.5 Archives

It is likely that most authorities will wish to retain indefinitely copies of its documents and it will have a policy concerning archival material. Although the centre may not be the authority responsible for maintaining archives, it will need to ensure that the appropriate section receives copies of all documents of permanent or possible historical interest. The archive copy may require special handling, and the following points should be considered:–

- It should not normally be made available for loan.
- It should receive the minimum of handling.
- Preferably it should be filed separately from other documents, and consideration should be given to special binding.
- It should not be annotated in any way, but any amendments subsequently issued should be retained separately.
- Downgrading and declassification authorities should be carefully noted together with relevant dates.
- It should be a copy in good condition, and printed on good quality paper. Some organizations do not accept microfilm copies as being archivally permanent.

6.6 Destructions

Once a decision has been made that an item is surplus to requirements its final disposal must be determined. Some documents should be returned to the sender, but a large number will have to be destroyed on site. It is this volume and bulk of the documents which will cause the main problem, but the different formats will also pose special difficulties.

In outline the procedures for destruction will involve a decision to destroy, the recording, witnessing and certification of such destruction and security during the actual disposal process. Various destruction methods are available, but the system to be used will depend on the format of the document.

6.6.1 Destruction of Paper Copies

There is probably only one completely secure way of destroying paper, and that is by fire under careful supervision and in controlled conditions. However, if a large quantity of bulk material is to be destroyed a heavy duty furnace may be required to ensure that the paper is completely destroyed. Some organizations therefore ensure that paper is shredded before burning. The disadvantage of office shredders are that they are slow, that bindings, paper clips, staples etc, have to be removed and that the cut size may not be small enough for security standards. A combination of shredding and burning is therefore probably the safest compromise. The ideal though is probably to use a pulveriser or disintegrator which will reduce the paper to a fine powder.

6.6.2 Destruction of Microfilm

The very advantages of microfilm as a storage medium create difficulties when it has to be destroyed. The volume of information stored on a small area of film necessitates its total destruction if security standards are to be maintained. A report published by HMSO[32] surveys the various methods available for the disposal of waste microfilm and chemicals. These alternatives can be classified as follows:–

- Total Destruction. This may be carried out by burning or by chemical action. The latter method requires very careful handling, because of the toxicity of the chemicals used. Incineration may be preferable but microfilm materials melt when heated and may anneal into a solid block. It is therefore unlikely that this type of destruction will be suitable for large amounts of classified material.
- Image Destruction. This again may be effected by chemical action or by heat. The images on diazo film and on silver film may be destroyed by using various solvents. The images on vesicular film may be erased by heat treatment. This requires a temperature of at least 120°C for up to 5 minutes. Image destruction techniques are slow and complicated, and care has to be taken to ensure that the image is erased completely.
- Mechanical Destruction. This may be achieved by shredding or by comminution. Shredding by ordinary paper shredders is not to be recommended as the shreds may be too large and can be read. The same is also true of rotary choppers which have been specially designed to destroy microfilm materials. Pulverisers or disintegrators are probably again the most suitable, as the fine dust is unreadable and can then be burned or buried.

7. REFERENCES

1. Daigie, F.J. — *Who Should Control Secrecy*. J. National Classification Management Society, 13, p.60, 1977.
2. – — *Security Procedures in the Public Services*. (Radcliffe Report). HMSO Command Paper 1681, April 1962.
3. Walkins, P.S. — *Filing and Storage of Reports*. Aslib Proceedings, 5 (4), pp.335-340, 1953.
4. Yates, B. — IN Holloway, A.H. and others *Information Work with Unpublished Reports*. Deutsch, pp.199-200, 1976.
5. – — *J. National Classification Management Society*, 12 (2), p.66, 1977.
6. Klopp, J.A. — *La Gestion des Documents ayant un Caractere de Restriction*. Paper presented at AGARD Technical Information Panel Specialists Meeting, Athens, 1979.
7. Gerrard, S.A.
Lyle, D.F. — *Handling Industrial (Scientific and Technical) Confidential Report Material*. Aslib Proceedings, 18 (8), pp.206-217, 1966.
8. Newby, F. — *How to Find out about Patents*. Pergamon, 1967.
9. – — *Security Procedures in the Public Service*, (Radcliffe Report). HMSO Command Paper 1681, April 1962.
10. – — *J. National Classification Management Society*, 12 (2), p.90, 1977.
11. Herner, S.
Heatwole, M.K. — *Planning of Libraries for Military Research Establishments*. Science, 114, July 20, pp.57-59, 1951.

12. Herner, S. — *Storage and Housing of Unpublished Research Reports*. American Documentation, 3 (2), pp.110-114.

13. Walkins, P.S. — *Filing and Storage of Reports*. Aslib Proceedings, 5 (4), pp.335-340, 1953.

14. Jackson, L. — *Technical Libraries: Their Organization and Administration*. Special Libraries Association (USA), pp.23-38, 1951.

15. Collinson, R.L. — *Cataloguing, Arrangement and Filing of Special Material in Special Libraries*. Aslib 1950.

16. Gerrard, S.A. Lyle, D.F. — *Handling Industrial (Scientific and Technical) Confidential Report Material*. Aslib Proceedings, 18 (8), p.213, 1966.

17. Orne, J. — *Maintenance and Reduction of a Collection*. American Documentation, 3 (2), pp.101-105.

18. Finney, C. — *Security of On-Line Facilities at DDC*. J. National Classification Management Society, 12 (2), p.57, 1977.

19. Peters, B. — *Remote Sharing of Classified Information and Programs*. J. National Classification Management Society, 5 (2), p.37, 1969.

20. Scoma, L. — *Data Center Security*. Data Processing, pp.19-21, (September) 1975.

21. Buckland, M.K. Gallivan, B. — *Circulation Control: On-Line, Off-Line and Hybrid*. J. Library Automation, 5, pp.30-38, 1972.

22. Sims, M.G. — *Preparing a Library for Computerisation*. (Paper presented at Aslib Electronics Group Annual Conference, University of Sussex, April 1978.)

23. Tedd, L. — *Introduction to Computer Based Library Systems*. Heyden 1979.

24. Eunson, B.G. — *Update: An On-Line Loans Control System in Use in a Small Research Library*. Program, 8 (2), pp.88-101, 1974.

25. Berlin, S. — *An Advanced Classified Document Control System*. Special Libraries, pp.160-165, March 1967.

26. Rea, J.C. — *Development of Criteria and Procedures for Management of Classified Document Collections*. Report by Information Management Inc., USA. (AD687482), 1969.

27. Buckland, J.A. — *Downgrading and Declassification*. J. National Classification Management Society, 14, p.54, 1978.

28. Campbell, B.U. — *J. National Classification Management*, 12 (2), p.58, 1977.

29. Van Cook, A. — *Information Security – Past, Present and Future*. J. National Classification Management Society, 12 (2), p.20, 1977.

30. Richardson, D.C. — *Information Security/Classification Management*. J. National Classification Management Society, 12 (2), p.127, 1977.

31. Holloway, A.H. et al. — *Information Work with Unpublished Reports*. Deutsch, pp.199-200, 1976.

32. — *Disposal of Waste Microfilm and Chemicals*. Report of the Coordination of Reprographic Services (Report M3). HMSO 1977.

Section 11

ORGANISATION AND MANAGEMENT

by
Dr Diana M.Leitch
Science Library
John Rylands University Library of Manchester
Oxford Road, Manchester M13 9PP

ABSTRACT

The establishment of a technical information centre and its aims and objectives are discussed. The identification and fulfilment of user requirements are shown to be vital to its success and the way in which these can be achieved by good management is emphasized. Careful planning is essential at all stages and many aspects of planning are described. The role of the staff, in particular that of the information manager, is defined and the effectiveness of the information centre is shown to be highly dependent on their contribution to it. Budget management and stock control are discussed and the impact of mechanization is considered. Active promotion of the centre's services is necessary and ways of achieving this are outlined.

CONTENTS

		Page
1.	INTRODUCTION	35
2.	ESTABLISHING A TECHNICAL LIBRARY/INFORMATION CENTRE	35
	2.1 General Considerations	35
	2.2 Aims and Objectives	36
	2.3 Identifying Users and Their Requirements	37
	2.4 Location of Facilities	40
	2.5 General Finance	44
	2.6 Information Transfer and Its Problems	45
	2.7 Overall Organization of the Centre	46
	2.8 Personnel Involved in the Establishment of the Centre	46
3.	PLANNING OF THE INFORMATION AREA	47
	3.1 Suitability of the Area	47
	3.2 Overall Planning	48
	3.3 Space Allocations	50
	3.4 General Layout	53
	3.5 Furniture and Equipment	53
	3.6 Security of the Area	63
4.	STAFFING	63
	4.1 General Observations	63
	4.2 Managerial and Supervisory Staff	64
	4.3 Technical and Professional Staff	69
	4.4 Clerical Staff	72
	4.5 Ancillary Staff	73
	4.6 Security Clearance of Staff	74
5.	BUDGET	74
	5.1 Initial Expenditure	74
	5.2 Recurrent Expenditure	74
	5.3 Non-recurrent Expenditure	75
6.	STOCK	75
	6.1 General	75
	6.2 Resources Available	77
	6.3 Stock Management	78
7.	MECHANIZATION	81
	7.1 Advantages and Disadvantages	81
	7.2 Existing Systems	82
	7.3 User Reactions	83
	7.4 Microprocessor Developments	83
8.	PROMOTIONAL ACTIVITIES	83
	8.1 Image Projection	84
	8.2 Publications	84
	8.3 Advertising, Questionnaires	84
	8.4 Lectures, Seminars, Exhibitions	86
	8.5 Information Retrieval	86
	8.6 Translation Service	86
	8.7 Personal Contacts	86
9.	FUTURE DEVELOPMENTS	86
	ACKNOWLEDGEMENTS	87
	REFERENCES	87

1. INTRODUCTION

It should be emphasized that the principal aim of a technical library/information centre is to provide an information service to working scientists and technologists, either to facilitate new research and development or to prevent the wasteful reduplication of R & D work already documented.

In this section of the Manual an attempt has been made to describe the main facets for the establishment of an information centre and guidelines are given on the principal organization and management aspects involved. As every information centre is unique in its requirements it is only possible to discuss problems and possible solutions in general terms.

The number of staff involved will depend on the resources available and may vary from a small unit employing one or two staff to a large organization employing fifty or more. Whatever the size of the centre the roles of the staff and particularly that of the information manager are vital to the effective functioning of the centre. Work attitudes and motivation are of the utmost importance and an overview of these aspects is given.

It is hoped that some of the aspects discussed will assist in the establishment of new, viable information centres and also assist established organizations to cope with changes in their situations such as expansion or contraction of their services, changing role, increased mechanization and similar problems.

2. ESTABLISHING A TECHNICAL LIBRARY/INFORMATION CENTRE

The establishement of an information centre either in a company or at national level usually results from an information failure. It can either be a failure to use available information or a failure to obtain available information.

2.1 General Considerations

2.1.1 Company Problems

A company may have collections of books, periodicals, and reports, scattered about various departments or in the possession of individuals who may work on a very dispersed site or even on different sites. This is particularly true of aerospace companies which may have many small, widely separated buildings which are used by different departments. Thus only certain people or groups of people within the company may be aware of the existence of this material. The awareness of the existence of information depends on communication and it is a very common experience for there to be little communication between groups of workers such as research scientists, engineers, or statisticians within the same company, even if they are working on the same site.

A member of staff in a company may require a piece of information, be it technical, managerial, or statistical, which is not available in his own company but he does not know how or where to obtain this information. He may be new to his work or he may have been in a certain field for a long time and although he is familiar with sources for the literature relating to this field he may not be familiar with sources for other fields. Unless he has a colleague or outside contacts experienced in acquiring information who can advise him he may merely decide to do without the information or spend a long time seeking it, often unsuccessfully. Neither result is satisfactory either for him or for the organization for which he works.

2.1.2 Company Solutions

Both these problems can be alleviated in a company by the establishment of an information centre where staff experienced in information handling will:–

- organise and be aware of all the 'in-house' information assets and communicate them to the employees, particularly those in research and development;
- know how to obtain information from outside sources both quickly and efficiently.

Their main role should be as communicators both within and outside their own organization.

2.1.3 National Problems

Many of the reasons given for the establishment of a company information centre are also valid nationally. Government departments may not use available information because they are unaware of its existence. If the work of an organization is published in the open literature, such as books, periodicals, and patents, then it is possible for other organizations to be aware of this work because of the wide circulation of such literature and the comprehensive documentation which it receives. However, each organization may publish reports of its own work which have a very limited circulation. This work may never be published in any other form and may be security classified. Information contained in these reports can be vital to other organizations and may assist government departments in setting up projects. Unclassified information in these reports could be used to aid the civilian community and should be promoted.

Even if an organization knows about vital information it may still fail to use such information because of difficulty in obtaining it. This is probably because no central organization exists which is aware of dispersed collections of material available in one country.[1]

2.1.4 National Solutions

Many of these problems can be solved at a national level by the establishment of a national information centre[2] and in particular one specializing in the acquisition and distribution of reports literature. The terms of reference for the establishment of the Defence Research Information Centre (DRIC) in the UK are described in CP 207 (Ref.3). As with company information centres, the size of a national information centre and the way in which it is organized will differ from country to country depending on the finance available, the size of the community to be served, and the type of service required.

2.2 Aims and Objectives

The main aims of a technical library/information centre should be that:

- It provides the material and service that is really required by the user.
- Information is brought to the attention of all those capable of making use of it and eligible to receive it.
- Material available is used.

It is little use having a comprehensive collection of information if it does not fulfil the needs of the customer[4] or he finds it difficult and time-consuming to access.

The main aims can be achieved by careful thought and planning before the establishment of a library/information centre and the following points should be considered:–

- Will the unit function as a technical library or information centre or both?
- What will it replace and what will be its role?
- Will it start up its own collection or will it take over the collections of existing small departments?
- Will it be centralized or decentralized?
- Whom will it serve?
- Will it hold current material only or retrospective as well?
- What type of material will it hold?
- How will it be funded?
- What sort of service is required?
- What type of staff will be needed?
- Where will it be located?
- What will be its relationship to the parent organization?

Many of these points depend on identifying users and their requirements and this aspect will be discussed subsequently.

2.2.1 Justification for the Centre's Existence

A library/information centre will either be a completely new creation or an improvement to an existing system. It may replace a group of smaller, dispersed systems which had not been functioning to the best of their abilities because none had the resources or financial backing to provide adequately for the users' requirements. There may also have been duplication of effort in obtaining resources. For instance, the UK Ministry of Defence decided that the best way in which the UK Defence Research Community could be served by a scientific and technical information service was by the establishment of a centralized facility within the Ministry. Thus the Defence Research Information Centre (DRIC) was established in October 1971 by combining the defence elements of the existing Technology Reports Centre (previously known as TIL – that is, the Technical and Information Library Services of the Ministry of Aviation) with the Naval, Scientific and Technical Information Centre (NSTIC)[5].

If a library/information centre is to be a new creation it must be shown that it is needed. A new information service had to be created when the UK Science Research Council established the Daresbury Nuclear Physics Laboratory[6] in 1965 to provide facilities in experimental and theoretical high-energy physics for a permanent scientific staff and university users. However, the laboratory was isolated in the Cheshire countryside many miles from any large established research or academic library whose resources could be used. Its employees, being of specialized scientific disciplines, needed information and consequently a library/information service on site was required.

2.2.2 Role to be Fulfilled

A major decision which must be made is whether the unit which is being established will function as a technical library or as a technical information centre. It is important to differentiate between the services which the two give.

Generally speaking, a technical library comprises a collection of documents which are acquired, organised and maintained. Having carried out these tasks, the staff do not normally provide a service to the users, other than to issue documents and act as custodians of the collection. In a technical information centre the staff not only acquire, organise and maintain the collection but also disseminate, and often evaluate the documents held. An information centre can for example prepare current awareness bulletins of new literature, provide information retrieval searches either manually or by computer, do translation work, and assist in the preparation of internal reports.

2.2.3 Time Factor in Achieving Objectives

If an information centre is replacing a group of dispersed units, particularly at national level, it is likely that it will taken over the holdings of these units rather than tyring to acquire its own initial collection of material. Thus, the holdings of DRIC are based on the joint holdings of the former TIL and NSTIC.

If, however, the information centre is new it will of course have to acquire its own collection of material. The management of the parent organization may employ an information analyst to liaise with the person who will eventually establish the centre and advise on the resources available and their application in a particular subject area.[7] It has also been suggested that a central government agency could provide such an information analysis service or provide independent information consultants. At the Daresbury Laboratory a research library was established on-site in 1965 and its first task was to acquire stock and implement exchange agreements with other institutes and organizations in order to build up the collection of material. The information service which exists there now was not established immediately but developed naturally from the library service and in 1969 a full-time information officer was appointed.[6]

It must be remembered, therefore, that whatever are the aims and objectives of a new library/information service and whatever the role is that it should fulfil it may be several years before the full role is achieved and before the true value of the service is appreciated by its users.

2.3 Identifying Users and their Requirements

The formation of the collection and the type of service provided depend largely on identifying users and their requirements. It has been stated that the average scientist or engineer spends about 20–25% of his working time searching for information.[8] It is therefore very important to provide the most efficient and effective information service possible.

Much has been written in the last ten years about user studies and surveys[8,9] and in the UK a Centre for Research on User Studies has been established in Sheffield.[10] Although useful, it must be remembered that a survey done for one information centre may not be of much relevance to another and surveys only have a short validity. Blom[11] has described a method which has been developed for determining the information needs of a group of research scientists. In his investigation the point of view taken is 'that unless the information needs of potential users are examined in the context of the job they do, the findings obtained will be of little potential value in providing design criteria for an information service'. A useful survey was carried out by Slater and Fisher[12] on the use of scientific and technological literature. They showed that the factors which influenced the information search behaviour of a user were:–

- The nature of the institution or organization in which he works.
- The user's job, subject field and rank.
- His academic training.

Other factors which are of importance are the previous experience of using information services and the ease with which any part of the literature can be used.

The essential requirement is to gather information on all these factors.

Questionnaires or interviews can be used to gather information on users[13] and their library habits and information requirements. Both have disadvantages. Users do not like completing questionnaires and only a few may actually reply. Interviews are costly in time.

If the staff are setting up a new service in an established organization it should be possible to assess the user's requirements[14] because these should have become fairly apparent in the brief for establishing the service. Also it is likely that some of the staff responsible for setting up the service will be familiar with the requirements of that organization as they may be recruited from the organization itself.

2.3.1 Size of Community to be Served

The type of organizations and people that the centre will serve must be ascertained, and also their numbers.

2.3.2 Nature of the Stock

In the fields of aerospace and defence this is a very important consideration as much of the literature is published in

report form. The decision, therefore, whether to take books, journals, abstracting journals, reports, trade literature, standards, patents, etc. must be based on a knowledge of user requirements. Will the centre carry a comprehensive subject range of the literature? This again depends on whether it is serving a research and development function, an engineering function, a management function or many functions.

Another factor which can be considered is the accessibility of alternative sources and the speed of service that they give. For instance there are large science and technical libraries in London, Manchester and Edinburgh with comprehensive holdings of books and journals. The British Library Lending Division (BLLD) which prides itself on the speed of its inter-library loan and photocopy service also operates an international service.[15,16] The research associations,[17] learned societies and trade associations[18] provide information services to their members. Consequently, it is not necessary to carry all the material that the users may need but only that which is required for immediate use or is not readily accessible elsewhere.

For example, DRIC specialize in report literature of British and overseas origin particularly in defence controlled and classified reports. This specialization results from the fact that DRIC is providing the service that the defence users require, i.e., access to limited report literature.

The Royal Aircraft Establishment (RAE) in the UK carries a full range of the available literature both in form and subject together with a classified report section because it functions as a library and information service to the whole of the RAE itself and to various adjacent establishments. It does, however, make full use of the BLLD service and other MOD units for material not frequently required and of DRIC for material not openly available.

2.3.3 Currency of Stock

Several factors affect this decision. Storage space, finance, accessibility of retrospective material and its usage. If setting up a definitive national organization, ideally retrospective material should be held because this may not be held elsewhere and other organizations will depend on the national organization's holdings for their requirements. An information centre in a company may only need, or be able to hold, limited quantities of material and a decision must be made either based on a cut-off date or on usage, e.g., the most useful lifetime of a report is estimated to be 6 years. Accessibility to retrospective material in other sources is also important, e.g., DRIC's holdings date mainly from World War II, although in the field of aeronautics they go back to the 1930s. They have thus a comprehensive retrospective collection of MOD and MOD-sponsored R & D reports. Thus a small company information service need only cover the literature of the last 5 to 10 years with certain exceptions for heavily-used materials.

2.3.4 Format of Stock

The three main choices here are conventional printed format, microform, or computer-stored material. Whatever may be written to the contrary, at the moment most users still prefer printed format to microform. However, the format of the stock is one area where user requirements cannot always be satisfied. The constraints of availability, storage and finance are forcing information centres to hold large proportions of their stock, particularly reports and even journals and abstracting journals, in microform.[19] Great care must be taken in choosing the right format for the collection, if needed there is a choice, and this choice should be determined by user requirements.[20] Where their requirements cannot be met efforts should be made to move as near these requirements as possible. For example, because of the users' preference for printed copy it is almost certain that a reader-printer will be required to convert microform to hard copy. Certainly plenty of reading equipment should be readily available. The format will therefore determine the type of storage and reading equipment needed in the centre. In a national information centre the format of the stock will be determined to a lesser degree by user requirements as it may be preferable to distribute reports in microform.

The choice of computer-stored material is only relevant to abstracting and indexing services where a computerized search can be carried out on a relevant data base to which the organization has access. Finance is an important factor in this choice and suitable staffing is important. The hardware needed to set up a computerized searching system is costly and search time has to be paid for. Staff trained in the use of computer terminals who are familiar with search strategies will be needed as it is not normally possible to allow the user to do the searching himself. The subscriptions to many printed or microfilm editions of abstracting journals are very high and printed copy causes storage problems. Consequently the difference in costs may not be very relevant when one takes into account the time taken to search printed indexes as well as the other factors.[21] It must be remembered, however, that most data-bases carry only a limited number of years of information and the years before this will need to be covered by manual indexes.

In practice therefore most information centres will have a mixed collection of material and will need storage and reading facilities to deal with it.

2.3.5 Lending of Stock

Whether the material held by an information centre is for loan, for reference-only, or is supplied for user's retention will depend on the following factors:–

- Type of information centre.
- Type of material.
- Satisfaction of user requirements.
- Storage space.

In a national centre where it is unlikely that users will visit the centre to use material it is essential that items can be loaned or at least photocopies can be sent. Providing there are sufficient copies of an item available, a retention copy can be sent to the requester. In loaning material it is essential that there is a very efficient back-up system monitoring all the loans and the movement of every individual item which has been received by the centre. The centre can, therefore, always account for every item of its stock. In the defence and aerospace fields, where much of the literature is classified, the requester must already have clearance to use the classified literature or he must be able to prove his 'need-to-know' before he can make use of such a service. DRIC, for instance, either lends reports or supplies them for retention to MOD staff and Defence Contractors who have this clearance. Microfiche copies of reports are sent for retention. The material which is held for-reference-only in a national centre is usually that which the staff need to use to provide a service to their users, for example, abstracting journals, ready-reference material, specific information tools and the master copies of the entire report collection.

In a company information centre where users generally go to the centre themselves or at least contact it by 'phone for immediate information it is much more likely that more material will be reference-only. The reason is that users conducting their own information searches expect to find their information sources readily available and do not want to wait several days for an item to be returned by another user. Therefore, as well as abstracting journals and ready-reference material, it is likely that copies of well-used general journals, and fundamental treatises will also be kept for-reference-only. It is also desirable that a reference copy of each report in the report collection, particularly an internal report collection, should readily be available. A second distinct copy of the report collection is useful and can be used to provide further loan copies if this becomes necessary. This need not be in the same format as the reports themselves. This objective can be achieved by microfilming the report collection.[22] The microfilm assists in maintaining the integrity and security of the collection. It should be stored separately for security reasons to avoid possible destruction with the rest of the centre's holdings. Such a system is operated by some companies and cases where there is a shortage of storage space it is possible that the printed copies will be removed to remote storage as the security collection and the microfilm will be kept in house. Most of the book stock and many of the more specialized journals in a technical information centre can be for loan if necessary, providing an efficient recall system is operated.

It must be remembered that if the information centre opts for having most of its material reference only then it must be able to cope with the desire that users have to take copies of the items away with them. Users do not normally want to spend several hours in the centre consulting several reports or reading journals but would much prefer to read such items when they have a free moment in their offices or laboratories, in the evening or when travelling to and from work. The requirement for material to be always readily available in the information centre is very difficult to balance against the requirement of being able to take the material away from the information centre. A compromise can only be reached by the adequate provision of photocopying and microform copying facilities. It must however be remembered that laws of copyright do exist and that all material whether printed or not is subject to such laws.[19,23] Users always think that the law applies to other people and not to themselves but the information officer must remember that he is the person responsible for adherence to copyright laws relating to items in his care. Copyright laws are being tightened up in many countries and several articles have been written on the experiences of information officers in the United States as a result of the change in copyright law there in 1978 (Refs 24, 25).

Another method of overcoming the loan/reference problem is to have multiple copies of well-used items. Certain reports and general journals come into this category. One copy could be kept as a reference copy in each case. Multiple copies of journals could be circulated to interested members of staff, for example, Flight International or Nuclear Engineering.

Storage can have a very marked effect on the possibility of keeping material as reference only within the centre. If it is necessary to remove items from stock because of shortage of space it may be better to allow certain items to be on extended loan to users. This point is discussed further in Para. 6.3.

Each centre will differ in its attitude to loan or reference-only material but the percentage of each will mainly depend on users' requirements.

2.3.6 Services Required

Most users, unless information specialists themselves, will probably opt for an information centre where varying degrees of assistance and service can be given to the user. This is particularly true if they do not have much time or the aptitude to look for information themselves. The type of service required from an information centre varies. Mason[26] states that 'information needs can be divided into two broad catetories' – Current Awareness and Ad hoc.

The first category covers the need of scientists and technologists to keep up-to-date with what is happening in their field. The way in which each individual chooses to do this varies from person to person. Some people may choose to use current awareness information services available in their subject area, others may feel that regular reading of a small

group of specialist periodicals will fulfil most of their needs, while others may glean information from a colleague who avidly searches out new information and disseminates it.[27,28]

The second category covers the need for specific information or a review of all the information available on a particular topic. Generally this need is a 'one-off' and is often an urgent need. How this need is satisfied again depends on the individual concerned and his previous experience in obtaining information. He may look for it himself, ask the information staff or ask a colleague who may be able to supply the information.

The main requirement of the current awareness service is that relevant information gathered from sources of information such as periodicals, reports, etc. must be passed to the correct person, in a form in which he can appreciate its significance, on a regular basis. Bethell[7] has emphasized the salient aspects – 'to the correct person' and 'in the right form'. The former requires that the information centre should actively involve itself in the whole organization and be aware of what individuals may want to know and the latter requires that the information be manipulated and produced in a form which can be used, e.g. foreign language material being translated, surveys of particular subjects being carried out, abstracts of relevant articles being prepared. Therefore there may be a need for the information centre to produce regular information bulletins, abstract journals, personal SDI profiles or even to provide a translation service. In this provision of a current awareness service it is being assumed that a collection of relevant material is available to provide the information for this service. Another point should be emphasized – speed. A current awareness service must be providing information on current material.

The main requirement of the ad hoc service is that relevant information is supplied either in the form of a short, quick answer, a detailed written report or by showing the user where the information can be found in relevant documents. Being able to satisfy the users' needs partly depends on the fact that the collection of material used to provide the current awareness service should also have been correctly and adequately catalogued, indexed and stored for later use. It also depends on the contacts which the information centre has with other organizations and individuals. If a member of the information staff cannot answer a specific enquiry using his own stock he should know where to obtain the necessary information. This should be one of the main services that an information centre provides: that of a link in an information network so that information can be obtained and communicated to all parts of the network. Enquiries not dealt with promptly and documents which cannot be supplied for several weeks do not give a good impression of the information service and do not satisfy user requirements.

Therefore there is a broad range of user requirements relating to the service required from an information centre. Which of these requirements can be satisfied depends on the finance available and the level of staffing of the centre.

2.4 Location of Facilities

There are two types of location to be considered – geographical and site.

2.4.1 The Geographical Location of a National Information Centre can be much more flexible than that of a company information centre. Users do not normally visit a national centre but usually communicate with it by telephone, telex, or post. Therefore a national centre can theoretically be located anywhere in a country providing there are good postal and telephone services between the area chosen and the rest of the country. It may be highly desirable for a centre not to be located in a capital city because of the high costs of office accommodation and the problems of recruiting staff and paying them sufficiently well to enable them to live in the capital itself. However, the centre must also be located in an area where professional and clerical staff can be recruited or to which they can be persuaded to move.

There may be historical reasons for siting the centre in a certain place if a centre has replaced the services of several other smaller units then the location of one of the previous units may be chosen as the site of the new centre. It may also be desirable for service reasons for the new centre to share certain facilities with other organizations. Therefore a site would have to be chosen which could accommodate all the organizations. If it is not feasible for new premises to be built to accommodate the centre then premises will have to be found which are suitable. These may only exist in or near a large city.

In practice therefore it is likely that a national centre will be located either fairly near to the capital city or other major city or centrally within the country. In the United States and in Britain defence national information centres are located approximately 15 miles outside Washington and London respectively.

2.4.2 The Geographical Location of a Company Information Centre

If the centre is serving several company sites then a choice must be made as to where the majority of users are situated. It will probably be necessary to have a centre serving each division of a company. In British Aerospace (BAe) there are information centres in Filton, Warton and other locations each serving one of the major divisions of the company. The locations of these centres were chosen as they are the major sites for each division and large numbers of personnel work there.

2.4.3 On-Site Location should wherever possible be determined by two main criteria:–

- Access to users.
- Space to expand as the unit's need for storage space grows.

It is unlikely that the personnel setting up a new company information centre will be able to choose a place on the site and have a special building erected there. It is much more likely that they will have to choose between one or two existing buildings. The factors which need to be considered in choosing which building is most suitable are as follows:–[26]

User access
- Who are the users, or prospective users, and where do they work?
- Are they all on the same site?
- What are the locations of the major information-using departments?
- Do any users come from other sites and what distances do they have to travel?
- What are the other information facilities on site?

Space
- Availability, i.e. what buildings or parts of buildings can be made available?
- Suitability, i.e. will the information unit fit into the space available, and is there room for growth?

Company staff should want and should be encouraged to use the information centre and it must be readily accessible to them. Studies have shown that people will not go far to find their information: 75 yards (70 metres) seems to be the distance beyond which users are reluctant to travel.[29] The number of times a person uses an industrial library is usually inversely proportional to his distance away from it. Consequently, the location of the information centre in a central accessible position is important.

In considering the factors relating to user access the planners should obtain a plan of the site and mark on it the location of the major user departments and the number of staff in these departments. If records are available which show the use made of existing services then the information manager can use them to compare the probable use levels of the locations between which he has to choose. Mason[26] describes a technique for doing this as follows:–

- Make a list of user departments and the number of staff in each.
- Multiply this number by a comparative use factor. These factors are derived from usage records of existing services (see Table 1).
- The figures resulting from these calculations are allocated to each of the possible locations for the information unit as follows:–
  (a) for all departments in the same building – the figure as calculated;
  (b) for all departments in other buildings – half this figure;
- These are then totalled and give an estimated acts-of-use figure for each building, and thus permit comparisons to show which of the available locations will be most convenient for the majority of its users.

TABLE 1

Examples of Usage Records of Existing Services*
(Comparative use factors are derived from these records)

Research	6
Development	4
Sales and market research	3
Engineering	2
Production	2
All others	1

*(from 'Information Management' by D.Mason. Stevenage, Peter Peregrinus, 1978, p.20. Reproduced by permission.)

An example of such a calculation is shown in Table 2.

The survey may give various results. It may show that there is one major group of users, two major groups or no major user group, in which case use of the service is likely to be fairly general. If there is one major group of users, e.g. research department, it is fairly obvious that the information centre should be located as close to them as possible. If there are two major user groups, each of equal importance and yet located well apart on a large site, there is a dilemma. There may be a case for setting up two information centres, one at the location of each user group but one being the headquarters for the information service. This question of centralization versus decentralization will be discussed more fully later.

If there are no major user groups on the site then a central location where no-one has to travel far to reach the information centre may be the answer. The alternative is to choose a location where staff go regularly such as the

TABLE 2

Calculation of Comparative Levels of Use for Four Possible Locations for an Information Unit*
(The results indicate the Research block as the best location)

Building	*Department*	*Number of staff*	*Use factor*	*Staff x factor for each building*			
				Head office	*Engineering*	*Research*	*Sales*
Head office	Directors & staff	20	1	20	10	10	10
	Finance	30	1	30	15	15	15
	Personnel	10	1	10	5	5	5
Engineering block	Engineering services	40	2	40	80	40	40
Research block	Research	70	6	210	210	420	210
Sales block	Sales	50	3	75	75	75	150
	Market research	10	3	15	15	15	30
		Totals:		400	410	580	460

*(from 'Information Management' by D.Mason. Stevenage, Peter Peregrinus, 1978, p.21, Reproduced by permission)

canteen, computer services, reprographic services, administration and personnel departments. If all these services are located together and the information centre is with them it can enhance its usage markedly. The other point which staff have to pass regularly is the main entrance and sometimes the company's headquarters building will be located there. If the information centre is located in this building then it would be accessible to other service departments located there, to the senior management and to staff who pass by each day.

The unit should be as near to the entrance as possible and preferably on the ground floor. From the point of view of user access this sort of position will mean that everyone in the same building will have to pass it on their way in and out.

The type of building which is available is also important and its suitability as an information centre must be considered. Expansion room is essential considering the rate of growth of scientific and technical material.[30] For an efficient service much stock has to be retained on site and provision must be made for it.

It should be noted that the weight-to-volume ratio of books, periodicals and microform material is high and consideration of floor-loading potential is vital. This is another good reason for locating the information unit at ground level or even having storage capacity at basement level. Floor-loading affects space requirements as it may not be possible to locate storage units or catalogues as close together as thought.

2.4.4 Centralization/Decentralization

Earlier the question of centralization versus decentralization was raised. Some of the advantages have been given as:–[31]

- Much greater specialization in a large unit than in a small one.
- Much greater specialization in a centralized system than in one which involves a loose linkage of independent units.
- Many jobs can be done once for the whole system instead of being repeated for each unit.
- The head of a centralized system has greater responsibilities, greater opportunities and greater rewards than is possible in a collection of separate units.
- More opportunities for junior staff to obtain promotion.
- Centralized purchasing can lead to economies.
- Centralized ordering can ensure that reference material provides a better coverage than is possible with small independent units.
- Unusual, expensive items can be bought which would otherwise not be available.
- Opportunities for enterprises which would not otherwise occur including mechanization and minor research projects. The use of equipment, such as a computer or an on line terminal for information retrieval, may be possible which would otherwise not have been feasible.

Some of the disadvantages are:—[31]

- Increased specialization can involve a lack of variety in work and an increasing absence of contact with general information work.
- Centralization of tasks tends to eliminate the personal touch and contact with users can be reduced.
- The head of a centralized system usually becomes more of a manager than an information scientist.
- There is often a long wait for professional staff to achieve promotion and responsibility in a large unit, whereas this can be achieved at an early age and a lower grade in smaller units.
- Centralized purchasing often results in supplies being not quite what was wanted.
- Centralized ordering frequently causes a chain of delays.
- A large centre is more likely to be subject to staff cuts in periods of recession.

By good management a centralized system should be able to gain most of the advantages and avoid most of the disadvantages. In practice, there is a complete gradation from totally centralized to totally decentralized information centres.

It may be necessary to establish small 'remote' libraries when different departments in a large organization specialize in a particular activity or subject area. This is particularly applicable on a large site where there are several major groups of information users all located at remote points on the site well beyond the 75-yd radius.[32]

It is important that users should make use of the information centre and its facilities and if the only way that this can be achieved is by setting up 'remote' libraries then they must be established. In general it is only the library function that is decentralized; the information service continues to operate from the chosen central location of the information unit. Users, however, should have immediate access to a member of the information staff and members of the information unit should actively involve themselves in these 'remote' libraries.

The main argument against decentralization is dilution of resources and expense. More staff will be needed if each service point is to be manned all the time (e.g., during holiday periods, lunch periods). Some stock will have to be bought in duplicate. There will, therefore, be extra costs. It should be remembered that substantial costs are involved when users have to break off from their duties to travel some distance across a site to obtain information. Therefore careful consideration must be given to the value of establishing 'remote' libraries based on maximization of the benefits of the information services and satisfying user requirements.

There are three main types of sub-units which can be set up;[31] two relate to an organization spread over a large site and the third to an organization having a number of research establishments remote from the main site. The last tends to be the most autonomous.

- The first type, a reference library in a remote building on a large site, will usually be quite small and its holdings will be confined to general reference material and specialized material relevant to the work of the researchers in that building.
- The second type, a branch information centre in a remote building on a large site, provides users with a service essentially similar to that provided by the main centre.
- The third type, is a library or information centre located in a research establishment of the organization, but a long distance away from the main information centre.

The arrangement at RAE Farnborough is an example of the first type of sub-unit. The Establishment, because of its layout, could not be served adequately from a single library centrally located. A library has existed there since 1918 to serve the Establishment in general but each of the scientific departments had also set up its own library service because of the distance from the Main Library and the specialized nature of each scientific department. The way in which these libraries have been and are now administered and the degree of centralization of library services which exists have been discussed by Wright.[32] The Main Library and departmental libraries coexist under one administrator. Centralization of library services refers only to ordering, processing and announcement functions. There is decentralization of personal service to readers.

An example of the third type of sub-unit is the service offered by the United Kingdom Atomic Energy Authority Northern Division. Fairly large libraries exist at Dounreay and Windscale and operate independently of the main information centre at Risley except for certain centralized services.

Nationally it is more likely that an information service will be centralized although there are examples, particularly in the Unites States, of decentralized national services such as the Educational Resource Information Centre (ERIC) and the National Library of Medicine (NLM) which are centralized as to input, preparation of indexes and data maintenance but decentralized in user use.

2.5 General Finance

Adequate financing of an information centre is essential, both at its formation and for the years to follow. Central Government has to decide on the importance of establishing and maintaining a national collection of literature and vote finance for it accordingly. Initially money is needed for accommodation, stock, equipment and staff. There are recurrent costs for stock and staff. Inflation has had a marked effect on general report literature price increases which were about ten-fold from 1968 to 1976 (Ref.33). Changes in the type of information available and methods for handling it may mean that new equipment has to be purchased and money must be available for this.[34]

2.5.1 Cost-Benefit Analysis

The costing of a library system should be made in a uniform and comparative manner and based on a number of defined standards used in costing exercises in any organization.[35] These standards include the following:–

- A list of expense and revenue heads under which data must be recorded.
- Agreed methods of apportioning costs on an arbitrary basis where exact analysis cannot be made economically, e.g. accommodation.
- A standard list of library operations so that similar tasks can be compared.
- An agreed list of units of measurement of output or service so that statistics are meaningful and comparable.

These standards can be used for routine costing or special costing exercises.

Many aspects of costing have been considered in Ford's[36] report prepared for OSTI on the costing of library procedures and by Mason.[26] In the latter he shows that the money it costs a company to have an information unit can be categorised in three ways:–

- Input of resources to the unit.
- Functions of the unit.
- Products and output.

and although the total expenditure will be the same in each case (i.e. the operating budget) the three different approaches to the analysis of costs will give useful information. The categories are shown in Table 3.

TABLE 3

Expenditure can be Analysed by Input, Function, and/or Output*

Input	*Function*	*Output*
Salaries	Acquisition and receipt of materials	Current awareness
Publications	Organising materials for use	Bulletins
Books	Indexing	SDI
Periodicals	Cataloguing	Clippings
Patents	Classifying	Information retrieval
Reports	Making materials available	Enquiries
Information services	Reference facilities	Retrospective searches
Computer time	Loan facilities	Reference services
Printing stationery	Photocopying	Loan service
Binding	Translating	Supply of documents for retention
Rentals	Information supply	Training users
Depreciation	Stock maintenance	Advisory service
General overheads	Supervision	

*(from 'Information Management' by D.Mason. Stevenage, Peter Peregrinus, 1978, p.101. Reproduced by permission)

Input costs are traditional costs found in all budgets, function costs can be used for comparison between different ways of carrying out the same task and output costs show the expenditure on each service. They can be used to compare the benefits gained from the service.

Total costs are known but it is difficult to know how much to allocate to each activity. Costs are then analysed and the cost-effectiveness and cost benefit of the information centre can be demonstrated. A simplified form of PPBS (Programming – Planning – Budgeting System) can be used and in this the objectives of the information centre and its

actual achievements can be compared.[37,38] In this type of system the activities which contribute to the objectives and the resources devoted to these activities are costed out.

Alternative methods of provision for each aspect of the information service should also be considered and a cost-effectiveness study carried out on these. The following questions could be asked about an alternative service:—[26]

- How would the alternative service be provided?
- Who would provide it?
- How would it match the effectiveness of the proposed service?
- What would be its total cost (i.e., costs of the service and the costs of customers in using the service)?

At the end of the costing exercise a rough figure should be available indicating the finance necessary to implement a particular form of information service and the cost-benefits and overall benefits of operating such a service rather than any other. The costing exercise should also have indicated the regular finance that would be necessary to maintain the same level of information service as implemented and might also indicate possible extra costs for future mechanization.

If there is no guarantee of adequate finance both initially and in perpetuation then careful thought must be given to the justification for the establishment of an information centre.[7]

If it is not possible to support a centre of a viable size then consideration should be given to other ways of obtaining information. At company level it might be possible for a company to use a common information centre that forms part of an Industrial Research Association[17] or certain national goverments have established regional Industrial Liaison Centres which look after the information requirements of various types of industry working in a common geographical area.[39] Nationally, the only alternative to a national information centre would be to give funds to dispersed collections of material so that they could be indexed and disseminated more efficiently.

2.6 Information Transfer and its Problems

There are several barriers to information transfer.[26]

2.6.1 *Inertia* is one, that is, the resistance of a user to expend much effort in acquiring information. It has been shown that this barrier can be lowered or surmounted by careful location of the information centre and by making the services easy to use.

2.6.2 Formulation of Requirements

Another barrier is the difficulty which many users have in formulating their information needs. This barrier can be removed by good communication between the information staff and the users. The information staff must therefore be sympathetic listeners and able to define the subject needs of their users.

2.6.3 Staff/User Status

A third barrier is the difference in status between the staff of the information centre and the user. This can take two forms. A senior manager may not wish to discuss his information problems with a junior member of the information staff. Many users would not readily approach a senior member of the information staff particularly if he was above them in position simply because it is not done in their particular departments. These problems can be overcome by the information staff being on good terms and having pleasant and easy relationships with as many users as possible.

2.6.4 Status of the Information Centre

It is important that the centre is not regarded as a low-level unit staffed by non-productive people who are a drain on the financial resources of the organization. The information centre must be seen as an effective, worthwhile and valued unit.

Its status can be enhanced by a reputation for good, efficient and speedy service. However service is not enough. The information centre must integrate itself fully into the organization which it is to serve and the information services must be brought to the attention of both top management and the users. In other words the centre must provide a service and promote its services.

It helps if the company or government department is enlightened enough to allow the information manager to attend company or departmental policy meetings[40] where he can be kept up to date with future information needs and if the centre has full departmental status rather than being a branch of another larger department. The information unit should if possible be directly linked to the director who is responsible for the information unit in a company or to a senior officer in a government department. This may only be possible if the unit has departmental status. If it does not have this status then the director who should be responsible for it should be the one in charge of the area where the majority of users work; in many companies this is the Research Director.

If it does not have departmental status then it will be necessary to decide to which department it should belong.[41] There should in many cases be an obvious department to which it could be attached, e.g. Research and Development Department, but if it serves all departments it may be better if it responds to a General Manager or General Director. It is very important that the unit should responds to a management "that has an understanding of the aims and objectives of the information service and a sympathy for the efforts that are being made to attain them".[26]

Both departmental status and involvement of the information manager in policy decisions enhance the status of the information centre in the eyes of the users. The information staff should be encouraged to see and study every part of an organization's operation. In this way they can become fully aware of the problems and information needs of the users and the users become aware of the information centre's existence and the interest of its staff in their work. They should also try to become part of informal information networks. This can be achieved by attending meetings and conferences, visiting users in their place of work and participating fully in the activities of related organizations.

2.7 Overall Organization of the Centre

One method of organizing a large information unit is to have the traditional library activities in one section and the information services in the other as shown below.[26]

Information Manager

Library activities	*Information activities*
selection	information analysis and recording
processing	current awareness service
documents to store	retrospective information searches
document supply	
enquiry answering	

It is preferable that the two sections should be unified under the same manager as they are so totally interdependent. One policy can be applied to both sections and the possibility of diverging policies should then not occur.

Indeed a different method of organizing the information unit which shows this interdependence is to have all the information receipt activities in one section and all the information supply activities in another as shown below.

Information Manager

Information receipt activities	*Information supply activities*
selection	current awareness service
processing	retrospective information searches
information analysis and recording	enquiry answering
documents to store	document supply

In a company the information unit may not be responsible for its own computing, reprography, security, etc. but will be dependent for such services on other sections of the company. It is important therefore that good relations exist between other service sections and the information unit so that these requirements can be adequately met. In a national organization all functions will probably have to be handled by the unit itself. The organization of the unit will therefore differ from that of a company unit because it will have to encompass all these other activities. For instance one UK national centre is organized on the following lines:–

Information Manager

Group 1	*Group 2*	*Group 3*
Report processing	Computing	Administration
Technical enquiries	Reprography	Security
Reports distribution and requests	Special studies	Registry
Publications	Specifications	Post room
SDI profiles	Translations	Stockroom management

2.8 Personnel Involved in Establishment of the Centre

The success or failure of an information unit depends to a great extent on the staff who operate it. In particular

the head of the unit or the information manager has a vital role to play. His attitude and approach to the task of organizing and managing the centre are fundamental factors in its success. His understanding of the organization or company, its information needs and the way in which it operates are very important and enable him to define his objectives, and design his information services so that they fulfil the users' requirements. The choice of information manager must be made with great care, for as well as having the preceding attributes he must also be able to choose, develop and lead his team of staff effectively. It is by their services and efforts that the information centre will be judged by the users.

In setting up either a national information centre or a large company one therefore, the choice of head or director should preferably be someone who has shown proven managerial skill and who has either long experience in the required technical field or experience in information work. Opinions differ as to whether an information scientist or a technical expert should be chosen for such a task but there is a consensus of opinion that managerial skills are essential. In organizations of this size the information manager is not usually involved in the routine work of the centre but in its overall operation and promotion.

In a small information unit the information manager will have to function as an essential part of the centre and do many of the routine tasks of the centre. He will probably have to embody all the essential attributes (managerial skills, technical expertise, a feel for information work) as well as many others and the choice of this person can be very difficult.

In all the previous discussions the term 'he' has been used to describe the information manager. This is for simplicity and in no way precludes women being information managers or indeed holding any post in the information centre.

3. PLANNING OF THE INFORMATION AREA

The overall impression of an information centre should be of a well ordered, efficient unit. If the user actually goes to the centre he should find it a welcoming, accessible place where efficient, speedy service is given and where he would like to spend some time. Careful planning at the start is essential.

3.1 Suitability of the Area

Once the space allocation has been made the information manager should discuss it with the manager in charge of accommodation and obtain detailed floor plans of the space available and of the building itself. He should also inspect the space available to see if it has any peculiarities which the floor plans do not disclose. For example, the ceilings may be too low to accommodate the standard height of shelving.

The important factors which must be investigated are:–[36]

- Access.
- Flexibility.
- Suitable dimensions.
- Location of obstructions.
- Services.
- Safety.

3.1.1 Safety Requirements

The last factor is of particular importance because if the area is not safe for use as a library then there is no point in making plans to use it. The manager should therefore check

- The number of access points.
- Existence of emergency exits.
- Possible fire and flood hazards.
- Floor loading.

New doors and windows may have to be fitted and old ones blocked up in order to provide the correct number of access points and emergency exits. In an old building the plans for the building may differ markedly from what actually exists when the space is acquired.

In a building shared with other sections, particularly in a research environment, special attention should be given to the type of work being carried out on the floor above, for this may give rise to fire, toxicity and flood hazards, e.g. from a laboratory.

Normal office floor loading may not be strong enough because bound volumes of periodicals, reports and even microfiche, when concentrated together, are very heavy. In the UK, CP3 (Ref.42) gives minimum figures for both distributed and concentrated loading for reading rooms, stacks and dense mobile stacks. Therefore the correct standard of floor loading must be attained to prevent damage occurring within the building. It may only be possible for shelving

to be located round the walls or above beams which severely affects the layout of the centre. This emphasis on floor-loading indicates why a ground-floor location for the information centre is so important.

3.1.2 Detailed Aspects

Floor area has to be considered but ceiling height is also important. If it is too low shelving may not fit in or it may be claustrophobic. If it is too high this can lead to heat loss in working areas and it may be necessary to have a false ceiling fitted.

The heating system should be investigated for it may cause obstructions in the centre or be inadequate to keep the environment at a comfortable working temperature. In older buildings the location of radiators and pipes must be noted as must the location of any other service pipes and these must be incorporated into the plans or amendments made.

Lighting, power and ventilation should be checked.[43] Adequate provision of each of these affects the efficiency and appearance of the information centre. There should be enough lights of the correct intensity and they should be available where required. Power points should be readily available and heavy-duty supplies may be necessary for certain types of equipment. It is better if adequate provision is made initially in order that the information centre can be fairly flexible in the future. The same applies to telephone points. Adequate ventilation makes the information centre a pleasant place to be both for the staff and the user. Air conditioning may be available but it is essential that windows should be designed to open and should open in case of mechanical failure.

Noise levels both internally and externally can affect the information centre and its usage. It may be necessary in an industrial environment to soundproof the walls if there is a noisy or vibrating machine in an adjacent room or one above or below.

Having considered the space allocated in the light of all the problems discussed the information manager will have to decide whether it is feasible to use it as an information centre. Since there may be very little other accommodaion available the only argument he may be able to use against it is on safety grounds. All other aspects will probably have to be circumvented and allowed for in the detailed planning of the area.

3.2 Overall Planning

The information manager should have a basic idea of what he wishes to achieve in the information centre and the initial stages of planning should have clarified the basic requirements. Although he should have his own ideas he should be willing to use other people's experience, read as widely as possible on all aspects of planning,[44] visit other information centres and even use library consultants if necessary to modify and refine his own plans.

The plans for a national reports centre will differ considerably from those for a technical information centre in industry because the former is concentrating on one type of literature, will not usually have users visiting it and occupies a much greater space, the whole of which it is responsible for. In general a whole wing of an existing building or a new building will be given over to the establishment of a national centre. Great care and attention can be paid to work flow and proximity of different operations and it should be possible to leave plenty of storage space for future use.

The plans for an industrial centre will have to pay much more attention to the user and also to the relationship with other departments whose services might be required or who might covet the space allocated to the information centre. The space allocation will depend very much on the importance the company gives to the centre. In general a reasonable area in an existing building is what will be provided.

3.2.1 Flow Patterns

In designing the overall layout the manager must decide on the relationship between the various activities of the information centre. The object should be to provide easy access and reduce staff or user movement. The main concerns are the requirements of users in obtaining services from the unit and the requirements of staff in providing these services. The services and functions of the centre have to be analysed and in the average organization this will reveal three flow patterns:–

- Flow of materials.
- Flow of information.
- Movement of users.

Anthony has discussed these flow patterns.[45] He has shown that a typical sequence in materials flow might be:

acquisition
↓
cataloguing
↓
display
↓
storage

and in information flow might be:–

scanning
↓
abstracting
↓
compilation of a bulletin
↓
dissemination

It is necessary to group the individual components of these flow systems into ordered functional units. Such a grouping will vary from one information centre to another depending on the size of the centre.

The third flow sequence, that of users, is much more difficult to define but it is now being considered as relevant.[46] No two users have the same needs. Often scientists and engineers will rely on finding the information themselves whereas production, marketing and administrative staff usually ask the information staff for assistance. It should be remembered that flow charts are useful but so is observation and commonsense. In general users will need:–[26]

- Easy and immediate access to a service counter/enquiry point.
- To consult indexes and abstracts together and at a point not too far from the documents indexed.
- A quiet area for longer periods of work.
- Easy access to the information staff.

Having considered the various activities thought must be given to their relative locations. The relationship between the activities has to be converted into a physical arrangement which will provide the most advantageous overall operation. A proximity table can be drawn up to keep the relationships in mind.

TABLE 4

Pre-Planning Proximity Table*

	Entrance	Service desk	Library office	Information office	Catalogue	Reports index	Reports file	Periodicals: current display	Ready-reference collection	Abstracts	Periodicals	Monographs
Entrance		3	3	2	2	2	2	3	3	1	1	1
Service desk	3		3	3	3	3	3	2	3	1	1	1
Library office	3	3		2	3	2	2	3	2	1	1	1
Information office	2	3	2		2	3	2	2	2	3	2	2
Catalogue	2	3	3	2		2	1	1	2	1	1	2
Reports index	2	3	2	3	2		3	1	1	1	1	1
Reports file	2	3	2	2	1	3		1	1	1	1	1
Periodicals: current display	3	2	3	2	1	1	1		1	2	2	1
Ready-reference collection	3	3	2	2	2	1	1	1		1	1	2
Abstracts	1	1	1	3	1	1	1	2	1		3	2
Periodicals	1	1	1	2	1	1	1	2	1	3		1
Monographs	1	1	1	2	3	1	1	1	2	2	1	

3 = must be close 2 = should not be too far away 1 = need not be close

*(from 'Information Management' by D.Mason. Stevenage, Peter Peregrinus, 1978, p.35. Reproduced by permission)

In such a table (Table 4) the relationship between each pair can be given a value or rating which measures the importance attached to that particular relationship. The diagram should reveal the most beneficial relative locations for the various units of the information centre. However, before a tentative layout can be made it is necessary to know how much space each activity is to occupy.

3.3 Space Allocations

In making space allocations the manager must take into account that space will be needed for expansion and future developments. In an industrial environment space is always at a premium and the information centre should appear fairly full from the beginning. Therefore space for ten years' growth is probably all that can be justified. In a national information centre allocation for a much longer period is desirable and should be possible providing the correct type of accommodation has been made available.

Anthony[45] has suggested that space is needed for four purposes:

– Storing documents	– books – periodicals – reports – trade catalogue collections – abstracting journals
– Reader activities	– display areas – reading facilities – catalogue and service area – special reading rooms, e.g. microforms – consultation of reference works, abstracting and indexing journals
– Staff activities	– work rooms – typing services – document copying – offices – staff rooms
– Services	– stairs – lifts – corridors – cloak rooms – entrance hall – cleaners' facilities.

The space required for services is only really of importance in a national information or document centre where a whole building is given over to that purpose. Only if there is a radical change in the function of the information centre, such as increased mechanization, should this space requirement change. The greatest space requirement is for stock and this is the requirement which will show concerted growth.

3.3.1 Stock

Very detailed calculations of the space requirements for stock are involved and these give only minimum figures because space always fills up faster than expected. The calculations should be based on the amount of material to be or expected to be housed.

Various figures have been published giving standard space requirements for different types of material, e.g.

6 bound volumes of periodicals/linear foot
9 books/linear foot

but it must be remembered that in different subject fields the literature is of different dimensions. It is essential therefore to do an average count in the subject field concerned and use one's own figures. Similarly 100 reports can occupy from 300 mm to 600 mm of suspended filing depending whether they are held as photocopies or ring binders, etc.

Tables showing the average figures for different types of documents are given in the Aslib Handbook of Special Librarianship.[45]

When doing space calculations allowance should be made for each shelf to be only approximately two-thirds full[43] plus an allowance for ten years (or more) growth. A library in which every shelf is filled to capacity is almost unworkable and is a frustration to staff and users alike. Views differ on whether allowance should be made for a certain proportion of the stock being out on loan at any time. It depends really on the type of stock the library holds, the space released by it being on loan and by the amount of stock on loan. The latter figure may vary from 35–45% in a smaller unit to 15–20% in a larger unit.

When the information manager has deduced some standard measurements for his own stock he can then estimate the space requirements. Equations which can be used to derive these requirements are given in the Aslib Handbook of Special Librarianship. The calculations are not as easy as appears at first for, particularly in an information centre where most of the stock will be periodical and report literature, allowance has to be made for the fluctuations in the time for which certain periodicals are retained, whether they are bound, varying numbers of volumes each year, the change in the number of reports issued in any report series during a given year, etc.

When the calculations have been completed the amount of linear space required can be converted into the amount of shelving required for storage and display. Approximate figures are that one storage stack (2.28 m ≡ 7′6″) high will take six shelves of periodicals or reports (75 volumes or ~ 750 reports) and seven shelves of books (125 volumes), one lateral filing cabinet with six racks will take between 750 and 1450 reports.[45] These figures can then be converted into space that will actually be occupied by storage stacks, filing cabinets, display racks, etc. Conversion factors are given in the Aslib Handbook of Special Librarianship.

It must be remembered that there must be an allowance for access space between stacks – four feet (1.22 m) in the open area, and either two or three feet in storage areas depending whether ladders need to be used between the stacks. In making his calculations the information manager should allow for the probability that not all the library stock will be on open access either for space or security reasons. The report file or back runs of periodicals may be stored in closed access and require less space than open access material. In this type of area mobile storage stacks erected in blocks could be used.

The final figure relating to the space requirements for stock arrived at, allowing for ten years' growth will probably be about twice the initial space required.

3.3.2 Reader Services

The space required for reader services will be based on the provision of seating and working facilities, catalogue cabinets, display racks for periodicals, service counter, microform readers, etc.

It is desirable to provide reading tables and chairs for users. A good arrangement is to have a few tables provided with two seats which can be used by people doing intensive research and other tables with four chairs at them which can be used for other purposes.

A typical seating arrangement for four readers is shown in Figure 1, and it can be deduced that each reader requires

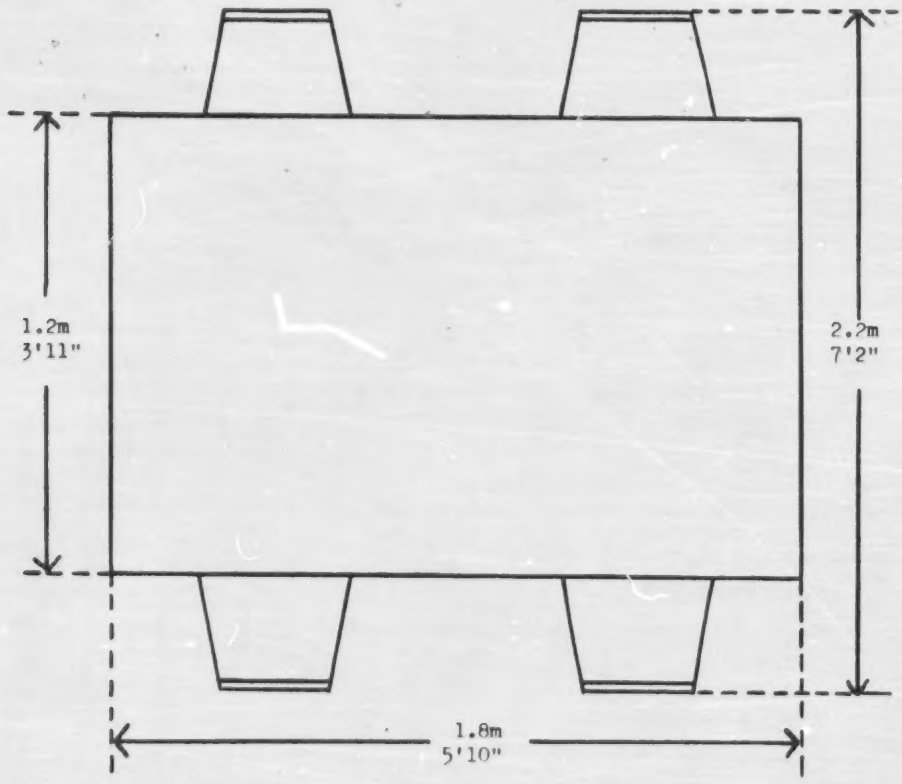


Fig.1 Typical seating arrangement for four readers

approximately 1 m^2 of furniture area. In addition the staff and users must be able to move past the tables and occupied chairs. The allowance will differ depending on whether the tables are grouped together or separated. If in groups only one foot (30 cm) need be left between an occupied chair at one table, and an occupied chair at an adjacent table, whereas if tables are separated at least three feet (91 cm) must be left behind the back of an occupied chair and a wall or shelving.[47]

The actual number of chairs and tables which should be provided is difficult to estimate as it depends on the requirements of each organization. The theoretical relationship quoted is 1 seat/25 potential users in the same or adjacent buildings to the information centre and 1 seat/100 potential users working elsewhere on the site.[26] If sufficient space is available the information manager should attempt to achieve such a provision otherwise he will have to compromise as best he can.

The other type of seating which it is desirable to provide are some easy chairs for readers to use when browsing through current periodicals and recent acquisitions. Small low tables are also useful. The creation of an informal area can make the information centre a welcome place to go and can improve the appearance of the centre in the eyes of the users.

Space must be provided for catalogues and indexes and for access to them. The allocation of space for these must either be based on previous experience or on observation of requirements in other centres. Room for growth and an allowance for the individual drawers never being more than two-thirds full should be built into the calculation. One way of saving space is to have whole or part of the catalogue on microfilm. Adequate provision of microfilm readers and space to use them must be made and the number necessary will be dependent on the extent to which the catalogues are used.

Current periodicals need to be exhibited on display racks. If space is at a premium it is advisable to choose racks which are most economical in their use of space and for versatility can be moved around from one area to another. It is also necessary to allow for space around them for access and for users to stand and browse beside the current issues.

If the service counter which may function as a control point, enquiry point and issue point is considered as part of the reader services then its space requirements must be considered here. In general one or two staff at least will work at the counter and consideration must be given to the amount of space that they require.

Accommodation will also be required for equipment such as microfilm readers, photocopying machines, acquisition record cabinets, visual display units, etc. The size of individual pieces of equipment should be carefully measured and then space allowed around them for them to be accessible and to be used by either staff or users.

If the users, their service area and all the stock are to be located in one room then the space allocations for all these functions which have just been discussed must be added up at this point. Allowance for access and space round the actual contents of the information centre can be made during the individual calculations as has been suggested. Alternatively, the contents themselves can be summated and the total figure multiplied by 3½ to reach a final figure for the total space needed. This multiplier is derived from an observation by Reed[48] that the 'gross area of a library is roughly three and one half times the aggregate area of floor projections of its contents'. The total allocation must be compared with the space available. It will be at this point that the information manager may have to make compromises if the two figures do not match.

If staff activities also take place in the same room then the space allocation for these activities must be added in at this point and considered as a whole with the other calculations. Adjustments can also be made for the amount of stock which will be available on open access. It may be possible or even desirable for instance to locate the reports collection separately and in a less accessible place than the rest of the stock. This will be essential if both unclassified and classified reports are stored together as open access cannot be allowed to users. Alternatively unclassified reports could be stored on open access and classified reports kept separately.

3.3.3 Staff Activities

The space allocation for staff activities is dependent on the number of staff, the type of work to be carried out, the equipment used in this work and the legal minimum space requirements appertaining in a particular country. In the UK for instance the Department of the Environment[49] recommend 10 m^2 per person for normal office areas. The Pilkington Research Unit recommended space allocations for different grades of staff and these standards are used by the Civil Service and major companies. It should be remembered that the space requirements are supposed to be exclusive of equipment and therefore in the case of libraries quite a large allowance must be made for space for trolleys, indexes, shelving, etc. Consequently, about 12 m^2 is a reasonable figure per person. Many small industrial information centres function with space requirements well below the required minimum but such conditions are undesirable and can lead to great frustration among the staff and users alike.

In setting up a new information centre the actual number of staff to be employed is difficult to estimate. The information manager should know the extent of the services which are required and for a comprehensive information service the figure of 1 for every 30–40 potential users has been suggested.[26]

The services may range from a small library provision to a full information retrieval and dissemination service. There may also be a requirement for the actual production of reports as well as their acquisition, distribution and

storage. If there is a high degree of mechanization or computerization of the service then space will be needed for such equipment. Such activities may change markedly during the projected lifetime of the information centre and although mechanization may not be feasible or even necessary initially it may become a necessity after a few years.

3.4 General Layout

Once the total space allocation has been estimated consideration can be given to the actual detail layout of the centre.

A diagram can be drawn in which the space allocated to each activity is shown in plan form together with links between the various activities. This is shown in Figure 2. Using this diagram a plan can then be drawn with the essential links reduced to the minimum distance possible. The plan should bring the activities of the unit into a good spatial relationship. This is shown in Figure 3. This is a basic plan for a small industrial information centre and in this plan a separate area has been allocated to the reports file which could be closed access. All the functions of the centre are located in one overall area. Provision for readers to consult the literature is made in the appropriate areas.

Layouts for industrial information centres have been discussed by Anthony.[45] The advantages and disadvantages of an open-plan layout for the staff area in a large information centre are also considered.

3.4.1 Detailed Planning

After the general layout has been planned the actual position of individual items, e.g. furniture or equipment within each area must be considered. It is very important to check that items will actually fit and this can be done by making scale models of the room and the equipment. It should be obvious from such models whether sufficient space has been left for access and for the carrying out of various activities both efficiently and safely. It is always good practice to consult the staff who will be working in these areas and to keep them informed of the plans. They may have some constructive ideas relevant to the detailed planning and be able to spot possible problems in the areas where they will be working.

3.4.2 Flexibility and Convertibility

It is particularly important when planning the information area to build flexibility into it initially. Thus shelving, equipment, etc. could be easily rearranged at a future date if necessary to accommodate unexpected expansion or changes in user requirements or role of the information centre. Possible modifications which are allowed for initially by flexibility of design do add to the initial cost of the establishment of an information centre but do save money and major upheaval in the end.

Flexibility and convertibility are much easier in a larger area so the information manager should try to obtain as much space as possible initially.

If too much space is available initially other services related to the information centre could be accommodated in the area and then other locations found for them at a later date.

3.4.3 Adherence to Plans

Once the plans are made and work starts on the information centre then every effort should be made by the information manager and his staff to see that the plans are adhered to. Changes in the plans which may seem desirable to others for aesthetic reasons should be resisted; only changes for technical reasons should be considered.

3.5 Furniture and Equipment

Furniture and equipment for an information centre should be chosen with care. It should be cost-effective, flexible, functional and enhance the activities of the centre and its appearance.

It is advisable when choosing any piece of equipment or furniture to consult the staff who will actually use it before it is purchased, for they may have experience of different models and their advantages and disadvantages. As well as acquiring manufacturers' catalogues, visits should be made to other information centres, manufacturers' showrooms and exhibitions to assess the different models which are on the market. All furniture and equipment should be seen and tried and if possible borrowed for a short period of trials to be carried out on it in the actual location. It is surprising how easy a particular shelving unit may be to erect and dismantle when the tasks are performed by a trained salesman, but how difficult the same tasks may be for the library staff.

The quantity of each type of furniture or equipment will depend on the calculations of space requirements and usage that the information manager has done, on the type of information centre that is being established and on the way the stock is to be organized.

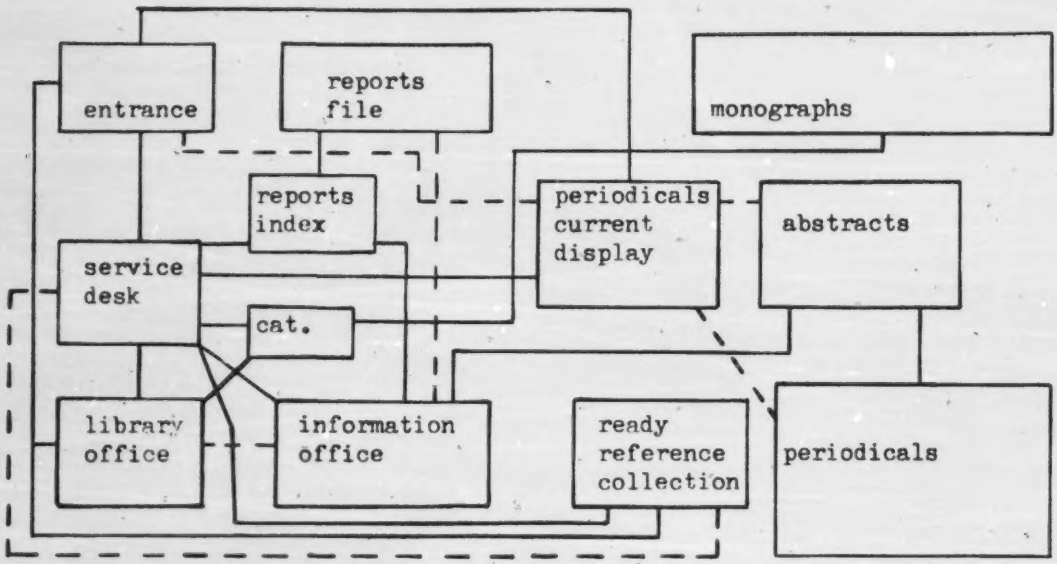


Fig.2 The space allocation to each activity is shown in plan form. Solid lines have been drawn between those activities which must be close together. Broken lines indicate desirable, but not essential, links

(from 'Information Management' by D.Mason. Stevenage, Peter Peregrinus, 1978, p.36. Reproduced by permission.)

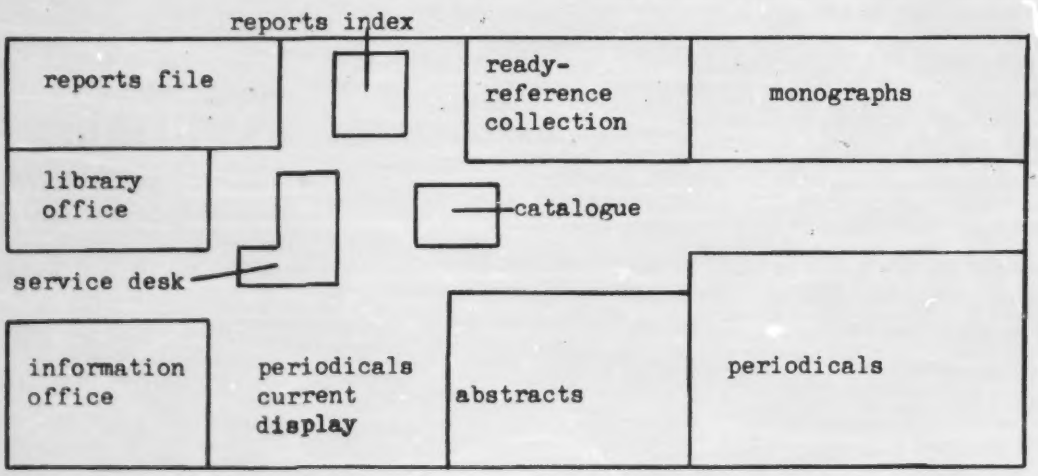


Fig.3 The plan shown in Figure 2 has been redrawn, the essential links reduced to the minimum distance, and the whole fitted into the actual space available

(from 'Information Management' by D.Mason. Stevenage, Peter Peregrinus, 1978, p.37. Reproduced by permission.)

3.5.1 Storage

Although there is a marked increase in the quantity of microforms being received most of the material in an information centre is still in printed form, e.g. books, periodicals, reports and specifications, and these items will have to be housed on some form of shelving or possibly in the case of reports in filing cabinets. The possibilities are open-access or closed-access compact shelving.

Open access

The recommended dimensions for this type of shelving are:–[51]

Overall height	2 m	
Overall width	900 mm	
Shelf depth	200–300 mm	(230 mm normal stock) (300 mm larger volumes of periodicals)

and it is suggested that the lowest (fixed) shelf should not be less than 200 mm above the floor. For bookstacks the height can be 2.3 m (7'6") with 15 cm (6") taken up by the plinth and top cover. Six shelves of periodicals or reports or seven shelves of books can thus be accommodated and the top shelf will be just over 1.82 m (6') above the ground. This is readily accessible to most users providing a few 'Kikstools' are available. Storage capacity can of course be increased by making the stacks higher and the shelves of less depth but then ladders will have to be provided.

There is a choice between wood or metal shelving and each has its advantages and disadvantages. Wood looks attractive, is a better sound absorber than metal and it can be used more easily in the manufacture of shelving of non-standard dimensions to fit into problem areas. It is however more expensive and less robust. The latter fact is very important because of the weight of bound periodical volumes. Wooden shelves can only be 61 cm (2') long or they will tend to bend under the weight and they should be at least 22 mm (¾") thick and the uprights 25 mm (1") thick. Steel shelves 91 cm (3') long will however support the same weight.

For various reasons metal shelving is being used increasingly in all areas of information work. The shelves can be supported in various ways and the units can be single – or double-sided.[45]

Whether wood or metal is chosen and indeed a combination of the two is possible by having metal frames and timber shelves, single shelving units should be chosen which can be screwed or bolted together to give long or short runs. Reports, for instance, can be stored loose on open shelves, in report boxes on open shelves or in hanging lateral files on shelves. The choice of shelving will depend on the method of storage and it might be quite useful to have shelving units which could be adapted to various uses.

Closed-access compact

In compact storage systems there is a reduction in the number of access aisles between units. There are three common systems:–

- The hinged unit.
- The drawer-type unit.
- The rolling unit.

and the latter is the most common. The first two are described by Metcalf.[43]

The use of a mobile storage stack depends on whether the floor can take the weight and such stacks are frequently located in basements. They move on rails and within a given block of stacks only one access aisle is needed. They can be of two types:–

- Units which roll in the direction of the shelf length.
- Units which move in a direction at right-angles to the shelf length.

One example of the first type (Figure 4) is where the units are arranged three deep. The stacks are moved along until access is obtained to the desired shelves. A problem associated with this type is that if there is a very long run of stacks with only one access corridor then inevitably whenever a document retrieval operation is necessary the access point will be at the furthest point from the desired access. A lot of time and effort will be spent moving stacks around. This can be overcome by designing the stacks so that they are in blocks of about nine, each with its own access corridor.

In the second type which is shown in Figure 5 the rows of units move at right-angles to their length and much greater savings in space to a factor of 3 can be achieved. Such units are heavy to move by hand when loaded and it is therefore desirable that a mechanically driven system should be installed. One such system uses compressed air to move the stacks and a soundproof place must be found for the compression motor. Such an installation is obviously more expensive than a manual system. If insufficient money is available then the number of rows between access corridors should be limited to two or three to give ease of operation by hand.

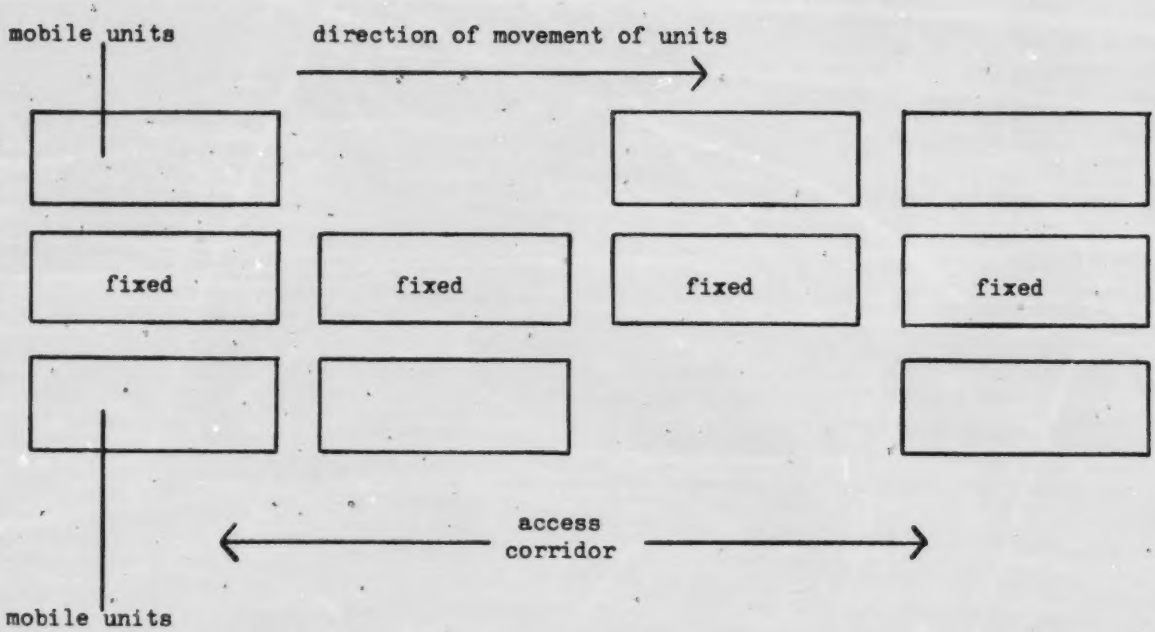


Fig.4 Rolling storage shelves where the units move in the same direction as their length

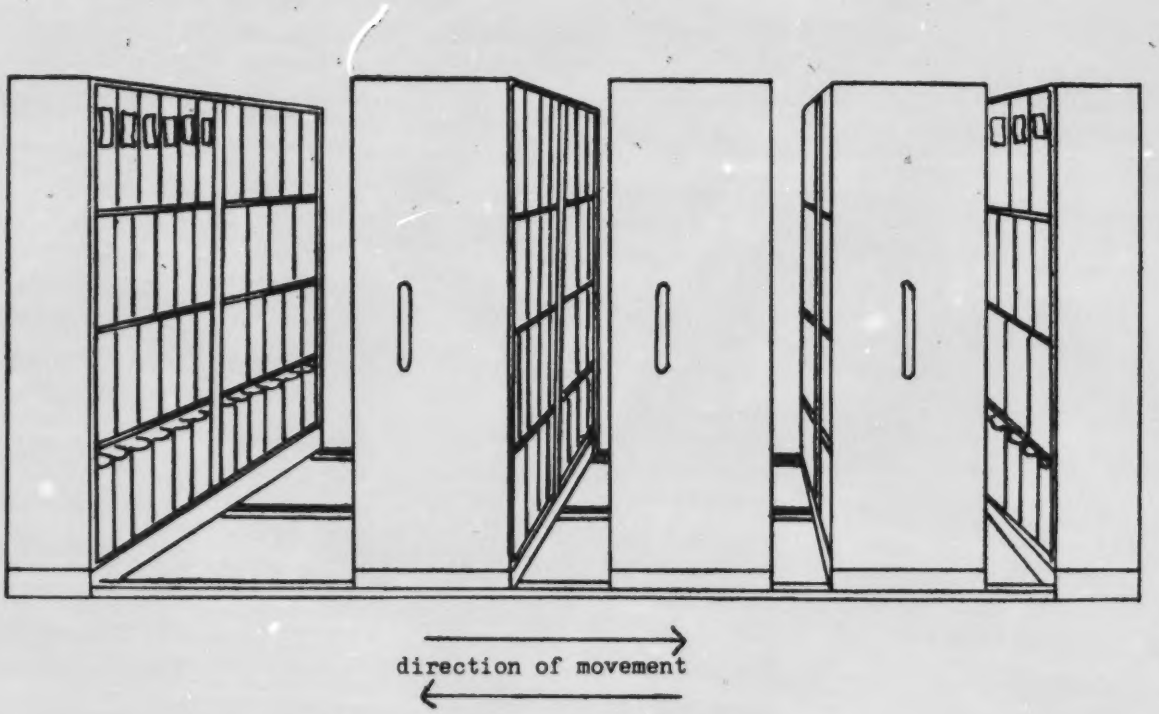


Fig.5 Mobile storage shelves where rows of units move at right angles to their length

Safety devices must be installed to prevent inadvertent starting of the drive motor when staff are using the racks.

Compact storage systems are being used increasingly for the storage of report collections where the rate of growth of material is very high and for security reasons the collection must be kept on closed access. The use of a basement, where the floor should be able to support the extra weight of this type of system, with very restricted access is ideal for this type of collection.

In a small information centre where there is no provision for a security area for all reports to be stored together it may be necessary to store classified items in filing cabinets. See also para. 4.1.2 Section 9 of this manual. A fully loaded drawer in a filing cabinet is both heavy and awkward to open and this form of storage, although widely used, is not recommended on a large scale.

In an industrial information centre it is likely that several abstracting journals will be taken. Individual volumes tend to be heavy and bulky and it is helpful if a certain type of shelving can be provided to enable readers to use these volumes with ease. Ideally a level surface should be available beside the shelving at a suitable height for reading standing up. This can be achieved by either having[26]

- Low shelving to house the journals and using the top as a table at 1.07 m (3'6").
- Standard height stacks but having the lower shelves one foot deeper than the rest to provide a ledge at the right height.
- A mobile shelf could be fitted and pulled forward for use as a reading surface.

The second method is the most advantageous. It allows for a firm base to support the volumes and prevents wastage of space by being able to shelve to the normal height.

3.5.2 Display of current periodicals, reports or pamphlets is an important method of disseminating information in an industrial information centre particularly where there is insufficient staff to prepare a current awareness bulletin or when journals are not circulated to individual users. It does however require space and suitable furniture to be performed adequately. The current part only may be displayed or back numbers may be stored alongside the current part. Which method is chosen really depends on the number of titles received and the space available.

If there is a large number of titles then usually it is only feasible to display the current part and there are units available either made of wood, plastic or metal which allow for a high density of display. Figure 6 shows a new method of periodical display using the principle of rotating, circular, space-saving shelves with sloping dividers.

Figure 7 shows a double-sided display unit with a steel frame and transparent plastic shelves.

If a smaller number of journals is to be displayed the back copies can be stored adjacent to the current parts. This can be achieved by displaying the current parts on hinged racks which lift up to reveal the back parts on shelves below. An example is shown in Figure 8.

A third system does not display the current parts very satisfactorily. An example of it in use in a large information centre is shown in Figure 9. The periodical issues are inserted into pigeon holes on horizontal shelves which slide in and out in a horizontal plane. The display units themselves can either be free-standing or located on a wall. Each shelf is labelled with the journal title, but the front covers are not visible. Such a system does, however, allow for a very high density of display and can be used for current and back issues.

However this can lead to confusion because the current part is not easily distinguished from the other parts and because of the limitation of space in each pigeon hole it may only be possible to store certain back issues on these shelves. The rest may have to be stored elsewhere.

Recent book accessions and pamphlets can be displayed on a special set of shelves designed for this purpose. It will, of course, only be possible to display reports which have no restrictions as to their availability.

3.5.3 Seating and Working Areas

In choosing tables, chairs and desks it is best to choose simple designs which are durable, flexible and comfortable. The type of table in general use is a four-seater (1800 mm x 1200 mm). The tables themselves should be stable and strong but be capable of being moved easily and put together. If space allows low circular tables (approx. 1200 mm diameter) and easy chairs with low backs and no arms are desirable in the display area.

5.3.4 Microform Equipment

Report literature is being provided and stored increasingly in microform,[19,52] particularly microfiche[53,54] and therefore equipment to store, read and provide hard copy will be required. An information centre may also have back runs of journals or abstracts on microfilm and even its catalogue on film. Older reports may be held as microopaques. Use is also made in some libraries of aperture cards.

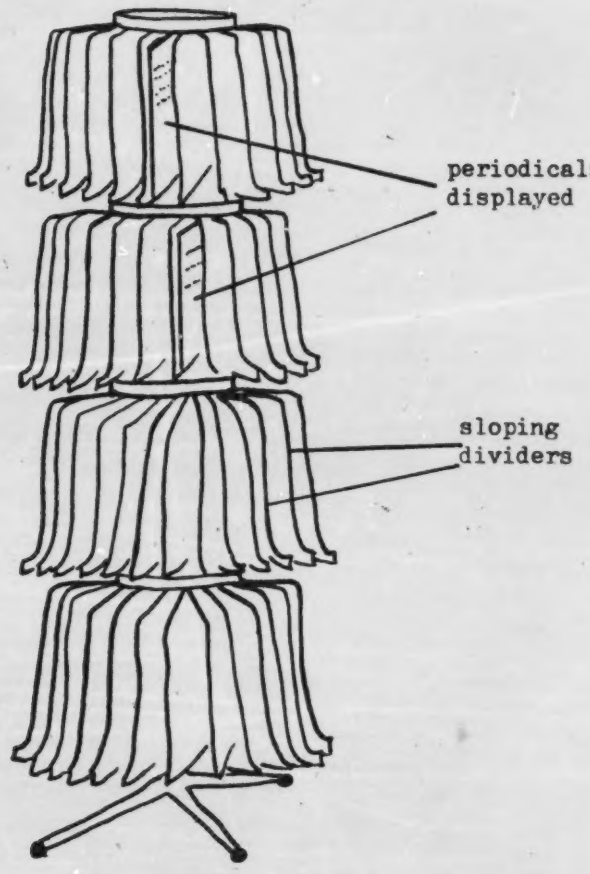


Fig.6 Rotating circular display unit with sloping dividers – free standing model consisting of four separate units joined together

Microopaques, fiche and indeed film can be stored in conventional card cabinets (9 x 12 cm or 10 x 15 cm) although there are special microform cabinets manufactured whose drawer size corresponds to the dimensions of the fiche, aperture cards, roll film or cassettes. Ideally fiche of different types (diazo and silver halide) should be stored separately and there are standards relating to the optimum storage conditions.[55]

There are large numbers of different types of readers on the market for microfiche and 16 mm microfilm. The range of products is much more limited for 35 mm microfilm. Valuable information on microform equipment is given in Section 9, Vol.III, of this Manual. The National Reprographic Centre for Documentation (NRCd) in the UK provides an excellent service in assessing different models and publishes results of their surveys. In most libraries it is likely that various models will be necessary and, as the best way of overcoming user resistance to micorform is to provide adequate, good equipment for its use the models should be chosen with care. The criteria laid down by Vessey[53] and Williams and Broadhurst[54] on the requirements for a good reader are still valid. It should be remembered that more seating may be necessary with the increasing use of microform readers.

Large numbers of fiche can be stored in an automated storage unit which allows for automated retrieval of the fiche. An example of such a piece of equipment is shown in Figure 10. Floor-loading standards apply equally to storage of fiche as they do to storage of printed material and particular attention should be given to the location of an automated fiche storage unit.

The needs of small users will generally be met by readers which are used manually. There are however certain models available which provide for fully automatic or semi-automatic access to a store of a certain number of microfiches. Examples of these models are illustrated in AGARDograph 198 (Ref.54). They allow automated retrieval and display in self-contained units.

Many librarians resist the requests of users for hard-copy form microform but generally there are valid reasons for requiring this type of copy e.g. copies are required for repeated reference or the recipient does not have access to a microform reader. Consequently a reader-printer will be required. Printers, capable of producing prints from fiche can be divided into two types: reader printers, i.e. readers with a print-out facility which usually produce A4 prints at the rate of

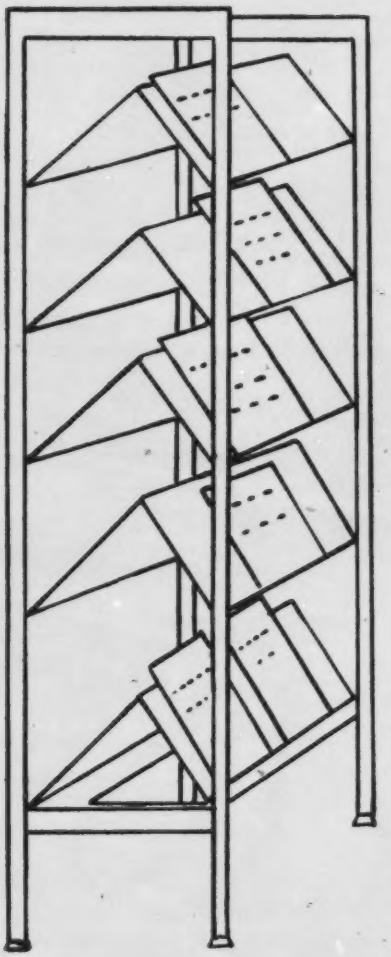


Fig.7 Double-sided display unit with a steel frame and transparent shelves

a few per minute or production printers. The former are much less expensive than the latter, which are specifically designed for high volume output. They incorporate an automatic step-and-repeat microfiche carriage and they can print out automatically according to a predetermined programme producing prints at high speed and at a much cheaper rate than ordinary reader printers. In a national organization particularly one that is acting as a distribution centre for reports or a large industrial information centre which supplies copies of reports to all company divisions the purchase of a production printer would be justified. It is important to remember when considering the purchase of a reader-printer that fiche may be used in future not just as a way of storing documents but as a cheap, light-weight method of transmitting information with the possibility of reconverting the information into printed form at the point of receipt.

The most convenient and economical way of reproducing the information content of a fiche is duplication as another fiche. Copies can be produced on demand cheaply and efficiently. Providing sufficient readers are accessible for users this method of disseminating information should be encouraged. The relative costs of reproducing the information on a 98 frame fiche as fiche and printed copy are in the ratio of from 1:40 to 1:100. Equipment to carry out this process is available. If the information centre is responsible for distributing report literature to other organizations the purchase of one or more of these duplicators is essential. The reproduction and copying of fiche has been discussed in Section 9, Volume III, of this Manual.

3.5.5 Catalogues and Indexes

Storage units will be required for the catalogues and indexes and the number will depend on the type and range of catalogues which will be maintained. Standard catalogue drawers usually of wood are readily available but should be checked for durability, ease of use and correct dimensions. If there is any possibility that the catalogue may be converted to computer print-out or microform in the future it is probably better not to over-provide for catalogue drawers.

There are several different ways of storing accession cards relating to the receipt and/or controlled circulation of documents received by the information centre. Individual reports or periodical issues may require their own cards if

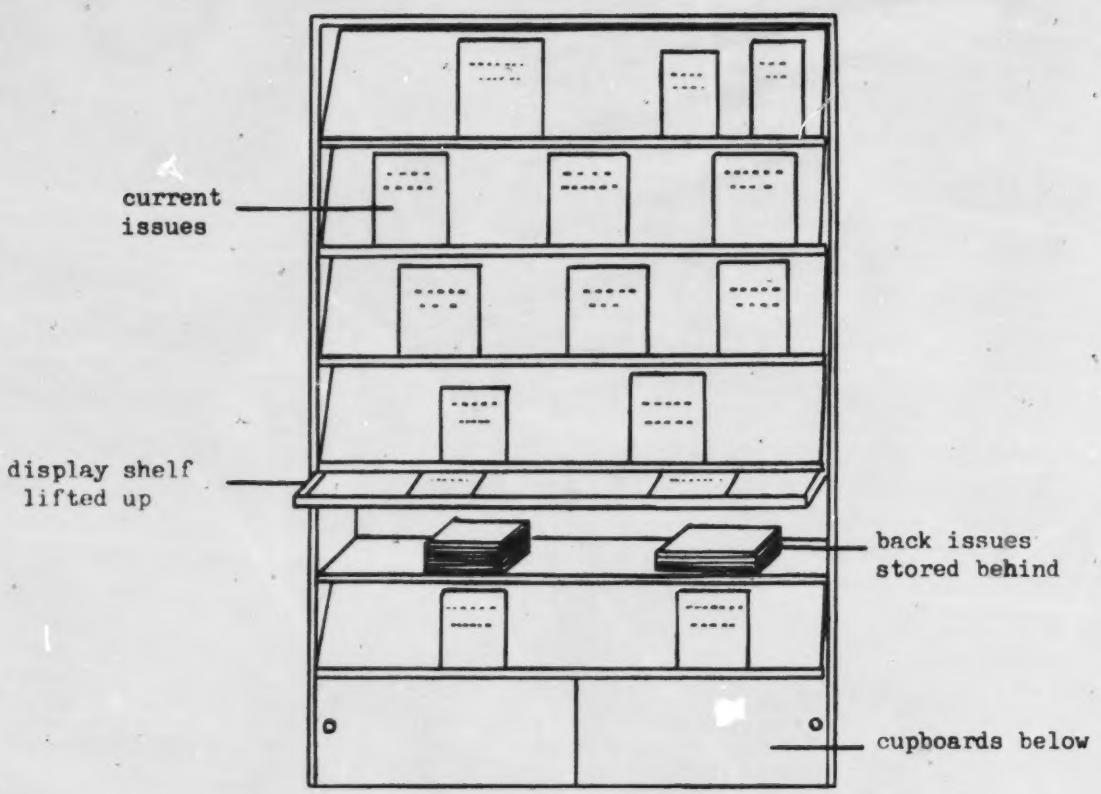


Fig.8 Display rack where back copies can be stored adjacent to current parts

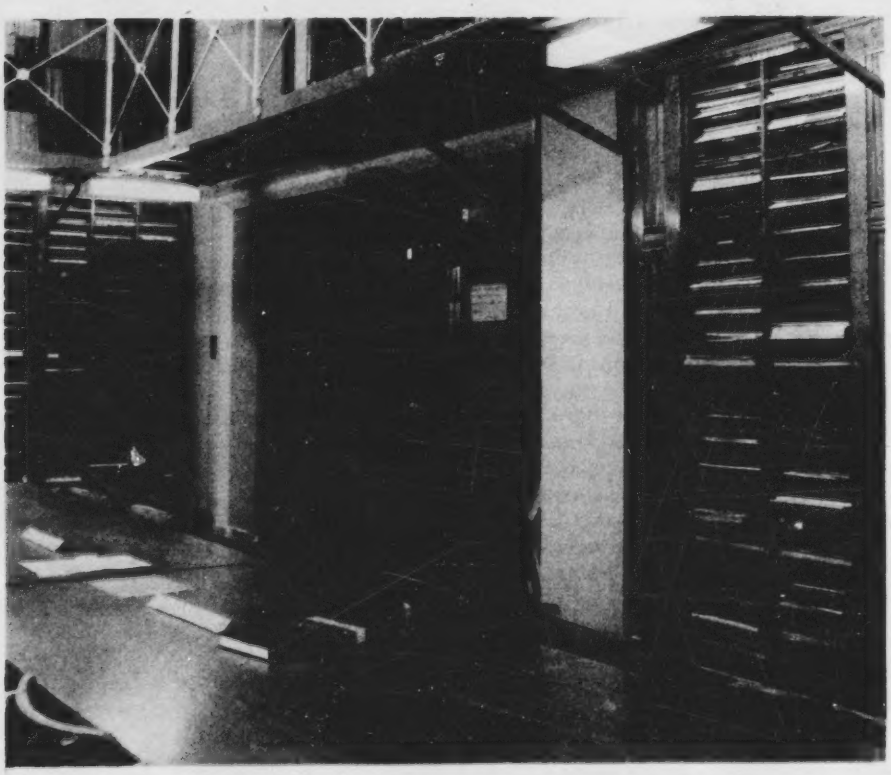


Fig.9 A periodical display system for current and back numbers built into the walls in a large information unit

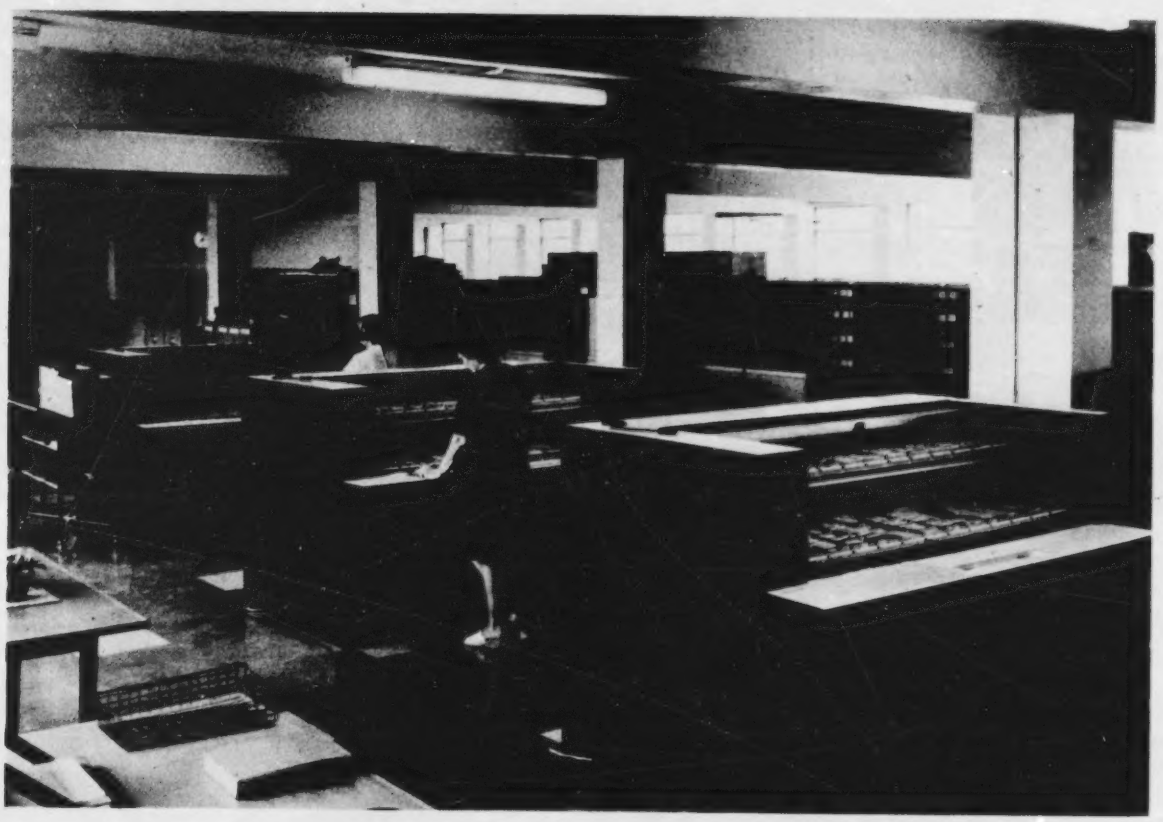


Fig.10 Automated storage units for cards/and or fiche in a large information centre

they are circulated and precise details must be noted as to the location of any item at any one time. Consequently a large number of cards will be involved and it will be necessary to have a large amount of storage space for these cards. They can either be stored in standard catalogue drawers of the correct dimensions or in a compact card storage system with facilities for semi-automatic retrieval. The latter is appropriate in a large national centre where document distribution is carried out and a large number of drawers is involved. The same unit as shown in Figure 10 can be used for this purpose.

If a small number of accessions cards is involved, e.g. cards relating to single periodical titles on which all issues received are noted on the same card or cards relating to inter-library loans on which all loans to the same user are noted on one card it may be possible to use 'Kardex' cabinets (Fig.11). These cabinets give very compact storage facilities for a large number of cards. Another method of storage of small numbers of cards is in a rotating wheel file (Fig.12). The cards can be arranged alphabetically or in numerical order depending on the receipt system being operated.

3.5.6 Ancillary Equipment

Almost certainly a photocopying machine will be needed even in the smallest centre. If the information centre is involved in the conversion of hard-copy into microform, e.g. it may convert all internal company reports to microfilm on receipt[22] to maintain an archival set or it may convert the hard-copy of a report into microfiche for ease of distribution, then cameras and all the equipment involved in this process will be needed. Reprographic processes and the equipment used are fully described by Rolls in Section 9, Vol.III of this Manual. The NCRd publishes current literature surveys on this subject and journals such as 'Micrographics Equipment Review and Reprographics Quarterly' should also be consulted for current information.

A paper shredder will be necessary to destroy unwanted documents and a microform shredder will be required to dispose of obsolete film. Security of information is an important feature of the operation and is described in Section 10, Vol.IV of this Manual.

A telex machine is used in most libraries either to transmit or request information and finds particular use in the area of inter-library loans.

Many information centres already use large-scale external information systems via on-line terminals although they may still use manual systems to control and accession their stock.

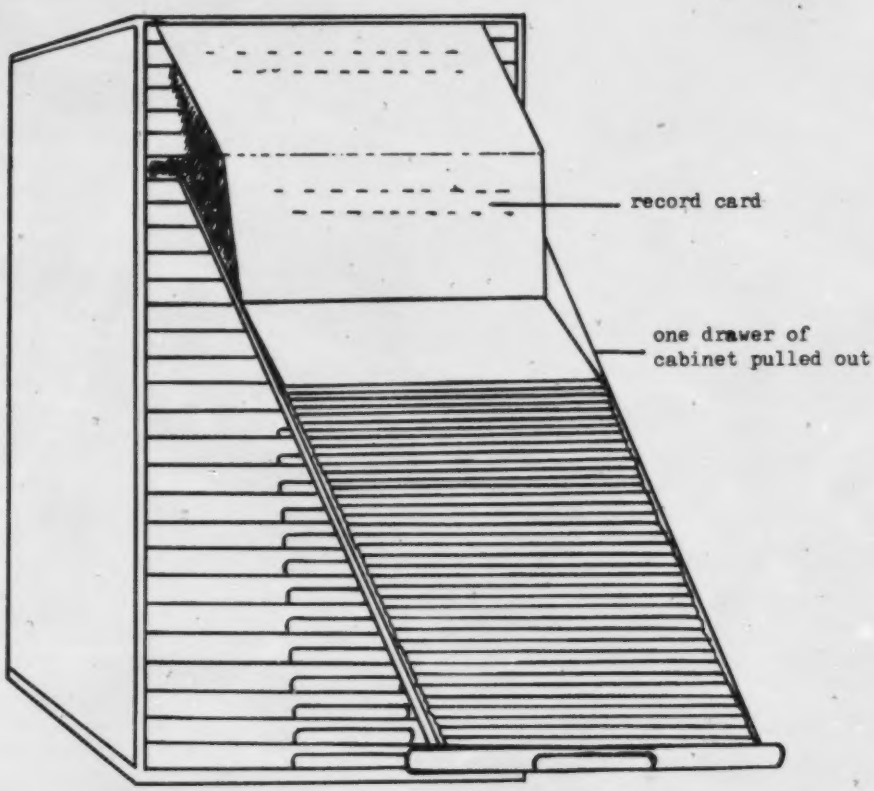


Fig.11 A visible records system cabinet

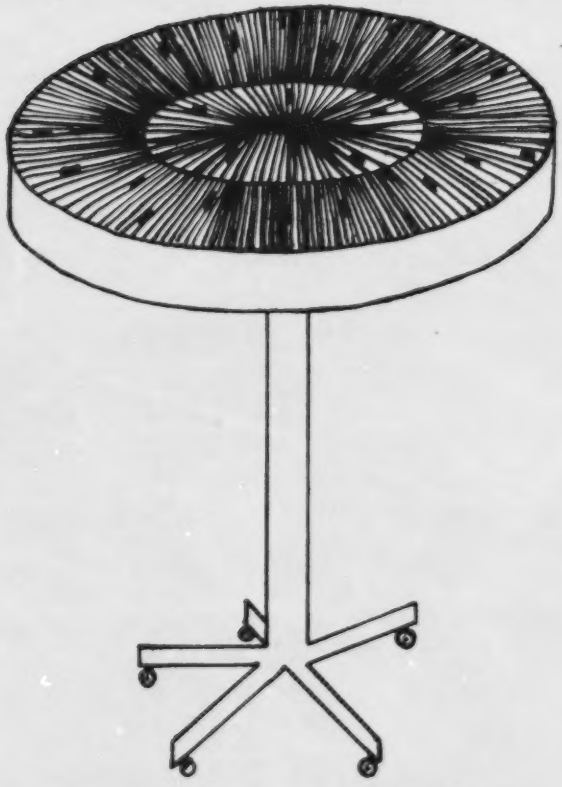


Fig.12 The 'Rotadex Cardmaster' mobile filing unit

If an off-line system is used then punched card equipment and tape typewriters will be needed as will storage equipment for the cards and tapes. If an on-line system is used then video or teletype terminals will be needed. Many such terminals are available and the choice of any particular model should be made bearing in mind all the centre's requirements.[56] Terminals are being developed which are almost mini-computers. A printer and disc storage system can be added to the tape cassettes, electronic keyboard and VDU to produce a self-contained information processing unit. Space requirements with this type of system are comparable to that needed for the peripheral equipment for a large-scale computer but the costs are small in comparison.

There will of course be a need for general office equipment such as typewriters etc., for general library equipment such as trolleys, 'Kikstools', etc., and for different types of stationery.

3.6 Security of the Area

In the field of aerospace and defence and increasingly in many companies because of industrial espionage, security is very important. Access to the information centre itself and its overall security will be determined by the security regulations appertaining to the particular organization it serves. This access will be controlled by security staff responsible for the whole organization. Consequently employees may be required to carry identity cards at all times and may need to use them to pass through security doors into all or certain buildings on a site. Visitors to the centre will generally be even more restricted and as well as carrying identity cards may have to be accompanied at all times by an employee on the site. All users should of course have been cleared by security before being employed on the site.

The information centre which holds classified documents must be planned so that access by users to these documents can be controlled and if necessary restricted completely. This can be achieved by either storing classified literature separately under conditions, e.g. padlocked and barred filing cabinets, which fulfil national or individual security requirements in the information manager's office or by housing the entire reports collection in an area of restricted access, e.g. a reports room in the centre of a basement to which access is limited to only authorised staff. The method chosen will depend on the space available and the stock to be stored. These security aspects are dealt with comprehensively in Section 10, Vol.IV of this Manual.

4. STAFFING

'An informed staff with high morale, working together harmoniously is indispensable; without it, no library can be good and no administration can be successful' Paul Buck.

4.1 General Observations

In 1946 at the ASLIB Conference Sir Reginald Stradling[57] saw the need for a trained staff, who recognized the 'need for an active encouragement in the use of the facilities provided, and not a conscious or unconscious passive waiting for someone to come to the library'. As Oldaker[58] says 'it is necessary to recruit staff who will measure up to this yardstick of activity and who will take their place in the organizational structure and be contributing to its welfare the whole time'.

From the information manager to the most junior clerk they should work as a team with the aim of providing a good service to the user. They should be flexible and versatile in their approach to their tasks and be prepared to put forward ideas which may improve the service or allow it to be modified in times of economic stringency so that the service itself does not deteriorate too much. The impact of mechanization and computer technology on library services emphasizes this need for flexibility.

Staff at various grades will be required but not all grades will exist in any one library as their numbers will vary from 1 to about 50 depending on the size of the information centre. A report in 1962 (Ref.59) suggested that the average ratio of library and information workers to professionally and academically qualified users in a research and development environment was approximately 1:30. A later collection of data[9] indicates that ratio ranging from 1:10 to 1:75 exist in different manufacturing areas and in engineering establishments can range from 1:17 to 1:116. There is no evidence to suggest that these later figures have changed markedly, they may even have deteriorated. Ideally the ratio should be between 1:30 and 1:40. If, however, the right type of staff are chosen at all levels then an information centre working with less than the ideal number of staff can operate an equally efficient service.

To provide the highest level of service possible staff should be properly motivated and studies of motivation have shown that the factors involved can be divided into two groups:[26,60] "dissatisfiers" and "satisfiers". The former deal with conditions surrounding the work situation, e.g. pay, working conditions, company organization and policy; the latter are factors related to a specific task. Examples of satisfiers are:–

- A feeling of achievement – sense of doing a difficult job well.
- Recognition – users and management appreciate work done.
- Responsibility – staff should be trusted to do their own jobs.
- Advancement – a clear line of promotion should exist.
- Value of the work itself – the work done should be necessary.

Many of the dissatisfiers are not directly under the control of the information centre. Most of the satisfiers can be achieved by effective communication between all the staff of the centre and by good management.

The personality of the staff is of particular importance especially in a small industrial information centre. Indeed in any library where there is much user contact the staff exposed to these users must be able to develop good relationships with them and must be prepared to put a lot of effort into helping them sort out their information requirements. Staff with totally different personalities can be recruited to operate a centre or parts of a centre where there is little user contact. They need to have an affinity for inanimate objects, their documentation, organization and storage, and should be content to work in an isolated environment having daily contact with a very limited number of people.

4.2 Managerial and Supervisory Staff

The managerial and supervisory staff can be divided roughly into two types; the information manager who has overall responsibility for the organization and management of the whole information centre and staff, subordinate to him, to whom he has delegated the responsibility for supervising certain parts of the centre.

4.2.1 The Information Officer or Information Manager is the hub of the information centre because the level of service achieved in the centre is almost totally dependent on the way in which he organizes the centre and his attitude to his staff, the users and to management.[61,62]

The definition of management includes two concepts:—[38]

The accomplishment of certain defined objectives.
That it is people who accomplish these objectives.

Accomplishing objectives through people is therefore the basic task of management. It is however an extremely complex and difficult task. The information manager, whose prime function is to provide an information service to the organization or company that employs him, achieves his objectives through relationships between himself and other people. An effective manager can lead, guide and influence other people but he must also be aware of and be able to assess situations and be able to put over his own ideas.[62] If a dynamic, outward-looking service is to be provided then the manager must be able to communicate with people,[63] ascertain their information needs and also understand governmental and company policies. His organization may advocate a specific style of management but he may be able to interpret their policies effectively in his own way.

Most information managers and librarians are aware of the need to have management skills but there are still a few who consider that there is incompatibility between professional ethics and managerial competence. The information manager may labour under stress but he should never 'take refuge in a depressed and passive state of vegetative retreat'[60] for if he does then his staff will do as well and will lose interest in their work, the service will deteriorate and user disinterest will occur.

The essential ingredients of an effective management style have been summarised in the following ten qualities of a good manager:—[26,60]

- Possesses moral integrity. His superiors, subordinates and equals know that they can trust him completely.
- Knows his job.
- Gets things done. He knows his staff, their strengths and weaknesses. He knows how to call forth the best from each one.
- Does not try to do everything himself. He delegates responsibility with commensurate authority and holds the delegates accountable for results.
- Gives credit where credit is due. He does not brush off good ideas, nor does he steal them.
- Is fair and impartial. He has no favourites.
- Is friendly but not familiar with subordinates.
- Always seems to be ahead of things. His foresight and planning make life less hectic, so that his staff can honestly feel that their energies are being spent on productive effort.
- Has a keen imagination, together with a saving sense of humour.
- Has the ability to inspire others to want to work.
- Has a sympathetic understanding of the other fellow's problem.

The seventh point is very important for the manager must ensure that an information service is user-orientated at all times and that unnecessary activities are not undertaken. Staff have confidence in their manager if he is impartial, understanding, dependable and consistent. It can take a very short time to damage staff morale and a staff's trust in their manager but a long time to restore it. Possession of these qualities enables the manager to bring about the best atmosphere under which to run an information centre and means that he should be able to present many of the 'satisfiers' to his staff and be able to overcome some of the 'dissatisfiers'.

The manager should ensure that all his staff understand the policy and objectives of the information centre and are involved in any new projects. He should also ensure that all his staff feel able and are able to communicate with each other and with him. If staff know what the unit is trying to achieve and what it has to offer then their actions and relationships with the users will reflect this knowledge. If the manager is readily accessible and approachable to his staff he can often, by listening to their problems, defuse potentially difficult situations and by considering their ideas, actually bring about better working conditions and improvements in the service.

The main tasks of the information manager have been defined as:—[64]

(1) Prepare the budget.
(2) Manage the budget in terms of material and human resources.
(3) Identify user needs.
(4) Allocate staff resources to meet needs.
(5) Recruit, assess and counsel staff.
(6) Perform local personnel function – matters relating to salary, welfare, promotion, discipline, morale, etc.
(7) Assess and manage the impact of change on people and on work.
(8) Communicate with higher management on matters relating to the total system (technical development, innovations, budgetary matters, staff movements, accommodation, etc.).
(9) Communicate with users and external bodies – represent the Unit at all levels, including handling of complaints, chair meetings of panels and working parties (formal and informal).
(10) Accept responsibility for security of documentation.
(11) Initiate or supervise appropriate development and training programmes.
(12) Maintain awareness of Company/Government activities, in relation to its business field(s), the information area and the environment; also publicize the Unit's contributions.

In a large information centre he may be able to function solely as a manager but in a small centre he may have to involve himself in the detailed work of the centre and in the provision of information as well as being its manager.

The manager's involvement in the budget (points 1 and 2) will be discussed in a later part of this Section. Most of his other tasks can be divided into staff management (points 4, 5, 6, 7) or liaison (points 3, 8, 9 12) tasks. The general relationship between the manager and his staff has been discussed already but there are also specific tasks which the manager must undertake with respect to his staff, e.g. recruitment, assessment, training, job evaluation.

The information manager is normally solely responsible for the selection of staff in a small firm, the actual paper-work involved with advertising of the post having been carried out by the company's personnel department. However in a larger firm or at national level he may have little involvement in the initial selection of suitable candidates for a post in his unit. The advertising, short-listing and even initial interviews to assess the suitability of the candidate for employment in that firm or organization will probably be handled by Personnel Group or a centralized recruitment organization. Such a system ensures that security clearance of potential staff can be carried out centrally but the final choice of staff should not lie with these groups.

The manager's recruitment of the correct type of staff is very important and it is vital that he should be present at interviews at which technical and professional staff are actually selected for the information centre. For he knows the requirements for the job and the personality and attributes of the applicant which will render him a useful and active member of the service. He will be responsible for seeing that 'square pegs fit into square holes' and for sorting out the clashes of personality which may occur between his staff. The information staff need to work as a flexible, harmonious team and particularly in a small group, working under pressure, there is no room for passengers or dissidents. He should therefore be prepared to reject unsuitable candidates. Indeed as many senior staff as possible, even if they cannot be present at the interviews, should see the written applications from candidates and make comments on them.

In order to assess candidates correctly the manager needs to be able to conduct an effective interview[65] and determine which candidate is best qualified for a specific position. An evaluative interview[65] is considered to be an effective interviewing method and is based on the belief that the best indication of what an individual will do in the future stems from what a person has accomplished in the past. The interviewer should seek to establish a dialogue with the candidate by asking key questions on specific points or areas relating to the past accomplishments (work, professional, educational and volunteer activities) and then listening to his answers. In this way the interviewer can gain the greatest amount of pertinent information from and impressions of the candidate. The interviewer should also ascertain the type of work environment and structure in which the candidate feels most at ease (e.g. independence v. supervision; variety v. concentration of activities; team v. lone assignments; flexible guidelines v. structured environment). From this information he should be able to assess whether the candidate would fit into the type of work pattern in the unit or could contribute effectively to its amendment if necessary. From the dialogue established the personality of the candidate should become apparent and it should be fairly clear whether the candidate would be able to respond to users and their needs and also to get on with the other members of staff in the information centre.

The candidate should also be shown his place of work and be introduced to the staff with whom he would be working. The exact nature of his work should be explained to him so that he can form his own judgement about the way in which he would fit into the organization.

It is useful for the manager to have a job description for each post in his unit and this can be used as a basis for recruiting new staff to fill vacancies, assessing the nature and range of tasks and responsibilities of existing staff and their possible training requirements. The contents of a job description should include the following:—[38]

- A clear delineation of what the duties and responsibilities are. New duties should be added by mutual agreement. If a job is changed, the written description should also be modified to conform to what the real duties are.
- The relationship of the position in question to the total organizational structure. Who will the employee report to? Are there any subordinates? What is the relationship between this position and other positions at an equal level?
- Explicit statement of the qualifications required to hold the position. The qualifications (e.g. educational background, professional status experience, personal characteristics) should be clearly stated.
- A clear definition of what the salary grade, promotion sequence and fringe benefits are.
- A detailed description of job content, description of tasks involved, skills required, work flows, quantities and performance standards.

Having recruited staff the information manager must allocate them to jobs which will meet the user requirements of the centre and also to which they are best suited.

In many organizations staff assessment is an annual event and the information gathered is used in salary reviews and for promotion appraisals. Staff assessment[66,67] is important as it allows each member of staff to know what his job is, what he is expected to achieve, how he is getting on, and to be given advice and further training if necessary. Generally the immediate supervisor will conduct the assessment and should use the job description as his base. It is possible to design a form to record all the facts needed and two possible examples are shown in Figures 13 and 14.

STAFF ASSESSMENT FORM

Name:

Department:

Date: Assessor:

Features to be assessed	Comments
1. Accurate, methodical, dependable	
2. Co-operative, helpful (to colleagues and customers)	
3. Shows interest and initiative	
4. Responsible, can be trusted to work alone, gets on with the job	
5. Good timekeeper	
6. Can plan ahead with due regard for priorities	
7. Can effectively supervise, train and develop subordinates	
8. Can present a case effectively in writing and orally	
9. Can inspire others to work towards a desired goal	

Fig.13 Form for qualitative assessment of staff under nine headings

(from 'Information Management' by D.Mason. Stevenage, Peter Peregrinus, 1978, p.88. Reproduced by permission.)

STAFF ASSESSMENT FORM

Name:

Department:

Date: Assessor:

Features to be assessed	Scale (tick appropriate column)				Remarks
	Excellent	Above average	Average	Below average	
1. Knowledge and skill (in job context)					
2. Communication (oral and written)					
3. Productivity (output, drive, initiative)					
4. Intellectual qualities (creativity, judgement, critical facility, foresight)					
5. Skill with people (leadership, cooperation, persuasive ability)					
6. Self-reliance (responsibility, decision taking, work on own)					

Fig.14 Form for assessing staff on a four point scale under six headings
(from 'Information Management' by D.Mason. Stevenage, Peter Peregrinus, 1978, p.89. Reproduced by permission.)

When the form has been completed by the supervisor, the member of staff should be interviewed and this interview can be carried out either by the immediate supervisor or by the information manager himself. The member of staff should be allowed to ask questions and to answer them. He should feel that the assessment which is agreed on is a fair one. It should be remembered that it is very difficult to quantify information work and the assessment should not be biased towards quantity but towards quality. The interview should indicate any problems which could be resolved by further training or alternatively a desire and necessity for promotion. It is very important that once training needs have been discovered that the information manager should endeavour to fulfil them as quickly as possible. He should also seek promotion, particularly for his clerical staff, who may have reached the highest level possible in the information centre and may wish to move elsewhere. The information gathered from staff assessments can be used in the planning of information services in the future and for preparing a succession policy in the information centre itself.

Some information managers feel that continuous performance assessment is preferable to an assessment that occurs once every 6 months or once a year. Discussing performance weaknesses with an employee is one of the manager's most difficult tasks and it is usually better to point out performance problems as they occur rather than at a later date.[38]

The information manager will need to be able to evaluate the jobs done by each of his staff in order to obtain a salary grade for each post. An organization may have a recognized job evaluation scheme within which the manager must operate[67] but problems can arise because it is very difficult to assess technical and professional information jobs against other research and managerial posts in the organization. Clerical posts in general are much easier to compare. The manager must therefore ensure that the job evaluation is fair to his staff and to the organization which employs them. The best way of doing this is to ensure that the people doing the evaluation know what goes on in the information service, use it and are thus able to make genuine comparisons with other jobs in the organization. The manager should also have data on salaries paid to information workers in other organizations for comparison.

There are two distinct methods of job evaluation[67] – one is qualitative (the ranking method), the other is quantitative (the factor comparison method). The former is based on ranking all the jobs in the information centre in order of

value or of difficulty, like jobs being grouped together in grades. Obviously these will range between the extremes of the manager himself and the clerical assistants with all the others fitting in between. This method shows the jobs in order of importance but not what the salary differentials should be or even how they compare with other jobs in the organization. The latter is based on the factors (e.g. mental effort, skill, physical effort, responsibility) necessary for the job. Scales are drawn up for the existing pay of specific jobs together with the percentage pay attributable to each factor. If key jobs have been selected and allocated to a certain level then others can be compared against them using these factors. The major factor is usually the decisions factor[68] and it is often difficult to assess for information jobs. It is, however, important that the manager should try to show to his top management that but for the decisions made by his staff in relation to information the effectiveness of the overall organization might have suffered.

It is in the field of job evaluation that the information manager can do most for the welfare of his staff but will also have to fight his hardest battles. Once jobs have been graded they will then have to be fitted in to the company or national scheme and this may be very rigid. Consequently once posts have been allocated at a certain level and the information centre has been given its hierarchical establishment then promotion within the centre can be very difficult and may involve waiting for long periods. The manager will need to maintain the morale of his department and give job satisfaction to his staff as a counterbalance to such a situation at the same time trying to advance their interests as much as possible.

At all times the information manager needs to be able to set himself apart from his unit and to make a detached view of its operation. He should see whether it is functioning efficiently, whether it is meeting user requirements, is it doing jobs that are no longer necessary, are the staff being used properly, would mechanization help, etc. Particularly in a scientific environment subject fields can change; he must ensure that the information being collected and the service being provided meets these requirements. With the information explosion that has occurred over the past years the number of staff in an information centre may not be able to cope with the increasing workload that has followed. In many cases information centres have had to decrease their staff and the manager has had to decide how and in what form the service can continue to function. He must ensure that staff morale is maintained and one way to lower it instantly is to have the staff totally overloaded with work. They feel that they are achieving nothing and are making no inroads into the workload. For example there may be a great backlog in the indexing and abstracting of report literature for a current awareness bulletin. The manager must then consider whether it is necessary for such a bulletin to be prepared, does it need to contain abstracts or should it only contain information not available elsewhere, e.g. in readily available commercial abstracting journals.

The manager should also be prepared to move staff around so that there are no interruptions to service because staff are on holiday, off ill or have too heavy a workload. His good relations with the staff and their flexibility are important factors here and can help overcome any possible union problems. Although a job description has been provided for each job he should impress on his staff that this is not a binding agreement with relation to the job they actually do.

He should try to compare the way in which his information unit functions with other similar centres and adopt some of their ideas where appropriate.

The way in which the manager can effectively assess and improve the value of his centre depends on his liaison capabilities with users, management and outside agencies. He needs to be constantly assessing user requirements and this can be achieved both formally and informally by attendance at company meetings, by visiting places of work and by casual conversations. He should be constantly aware of changes in company business, government contracts, new techniques being developed, etc. and be prepared to provide the relevant information. His good relations with his superiors and other managers in his organization are vital to the existence of an internal communication network and will assist his own staff to form their own informal networks.

The manager should also be a member of as many relevant outside organizations as possible, which may enable him to extend his contacts in the information field and in the subject field with which he is concerned.[69] Such organizations in the UK are Aslib (Association of Special Libraries and Information Bureaux), Library Association, and the Institute of Information Scientists. By attending meetings of these organizations he may make valuable contacts who will be able to provide him with information quickly when he needs it or with new ideas for the organization of his centre. To the information officer working virtually alone in his information centre, contacts are vital and are part of the informal network from which he obtains valuable information. He should also encourage his staff to participate in the meetings of these organizations, whenever possible.

Effective promotion or marketing of the information service should be organized by the manager.[70] The promotional activities of the centre can be generated by him in liaison with his staff and are dealt with in Chapter 8.

As well as the many tasks already discussed the manager is responsible for the overall security of his information centre. This is true in any information centre but critical in a centre holding classified or sensitive information.[71] He must therefore ensure that at all times classified documents are handled, processed and stored according to the security regulations appertaining in the particular organization. Although his staff are of course also bound by security regulations he is responsible for their actions and his is the final responsibility.

Classified material will be available to the enquirer on a need-to-know basis but the manager should not have to decide who needs-to-know. This should be decided by the appropriate authorities and the information staff should merely operate according to a given scheme. Thus friction between the staff and users can be avoided and the security of the information can be maintained.

The formal qualifications of the head of library and information services should be irrelevant providing he has management ability and knowledge and understanding of information services and techniques. It should be unimportant whether he is a Chartered Librarian, an Information Scientist or a subject specialist who has been in a technical field. The important factor is that he should be a good manager.

4.2.2 Clerical and Supervisory Staff

In a large organization many of the administrative responsibilities for the clerical functions can be delegated by the manager to a supervisor/s in charge of the clerical staff. This person/s will be responsible for maintaining all the clerical functions such as counter services, typing, xeroxing, processing of records, storage and retrieval of reports, distribution of reports from outside organizations, etc. In a large national organization many of these functions are quite distinct. In a small organization there may not be enough staff to merit the official appointment of a clerical supervisor but even if there are only three clerical staff one may naturally hold overall responsibility for the work that the three of them do. He/she may be on a slightly higher grade than the other two.

The clerical supervisor is likely to have risen through the ranks to achieve his/her appointment and will therefore be very familiar with the work to be done and the processes involved. Such a person is invaluable to the manager for this knowledge and the two should have a good, easy relationship. However, because of his/her involvement in the same type of work over a long time it is possible for inertia and resistance to change to occur. Good communication and involvement from the beginning in the need for such changes can overcome many potential problems. Because of this necessity for communication the supervisor should be someone who is able to direct the work of others, bring out their best abilities, lead by example and liaise with management effectively and amicably.

4.3 Technical and Professional Staff

4.3.1 Functions

The technical and professional staff in an information centre have various functions to perform related to the documentation and dissemination of information. In a large unit their jobs may be quite specific but in a small unit they may have to undertake a wide variety of functions including:–

- Acquisitions
- Cataloguing and indexing
- Information retrieval/dissemination
- Microform handling/audiovisual
- Inter-library loans
- Abstracting
- Data preparation/handling
- Computerized activities
- Translating

Whatever function they perform they should always try to be aware of the system of which they are part and be prepared to put forward ideas which may improve the system. They will of course be responsible for the application of security procedures and they should be prepared to accept this responsibility.

Many of the functions listed above have been described in detail in other sections of this Manual and will not be discussed here.

In some organizations inter-library loans are handled entirely by clerical staff. Although clerical functions such as checking locations and the paperwork involved can be undertaken adequately by clerical staff the initial assessment of the item requested should be carried out by a member of the professional staff. He can, from his technical or background knowledge, frequently eliminate unnecessary requests, because he knows that the item requested is available in another format in the information centre or can be obtained readily from a particular location.

In a large organization the professional staff will of necessity be rather specialized in their function because of the intricacies or volume of the work they do. Arnold[72] in his paper outlining the expansion pattern for library and information services showed increasing specialization to be the normal basis for development. For instance a person specializing in information retrieval using a particular computer-generated data base will probably have to use it for long periods to provide an effective service. It is very easy for this operator to lose contact with the other operations of the centre or the literature coming into the centre. One compromise is for each member of staff responsible for a specific function such as this to do a small amount of other work each day. At DRIC for instance, each member of staff involved in information retrieval also abstracts and indexes a certain number of reports each day in the subject field for which he is responsible.

In all organizations versatility of professional staff is important. Staff may stagnate in particular functions and become bored with some of the routine, dreary tasks. With the increasing use of technology in information work staff

must appreciate the changes in their methods of working and be prepared to learn new skills.[73] This is particularly true in smaller organizations where staff numbers are limited. The way in which the Information Centre at Daresbury Nuclear Research Laboratory has coped with the diversification of the laboratory's interests without increasing staff numbers or taking on specialists has been described.[6] The role of subject specialism in the future development of information services has been discussed by Dalton.[74] He considers the impact that technology and particularly on-line retrieval is having on information workers and shows how the ready availability of information is throwing an increasing emphasis on the need to collate and analyse it. The ease with which information is becoming available makes it likely that a few well-equipped information scientists will be able to provide a level of personal service that it previously required a large number to produce. Consequently others can modify their roles and provide information not on a customer basis but on a wider organizational basis by collating, collecting, analysing and disseminating information in key subject areas so that the information service becomes anticipative of users' needs not just responsive to them. The extent to which subject areas can be covered will depend on the manpower resources available. He has suggested that a small information centre could be run by 3 or 4 professional staff, with the possible addition of a systems specialist who is responsible for all the support functions. This counteracts Arnold's[72] argument that increasing specialization will be the normal basis for development.

There are various ways of allocating professional staff to their jobs. Wright[32] has described the staffing structure at RAE Farnborough. It has changed slightly since then but the decentralized organization which he described still exists.

The professional staff have specific duties relating to centralized library functions in the Main Library Reading Room and Reports Library, but they are also part of one of three Groups which look after specific departments. They are responsible for all the library and information functions for those departments and the administration of Departmental Libraries under their care. This gives variety to their duties and brings them into close contact with users. Here there is no distinction between library and information services. The group librarian system which differs from that described by Wright[32] is shown below:–

All groups	Selection, classification and cataloguing of books in the Group's interests. Reports subject analysis, allocation to Department's sections and individuals. Updating of Interest Register for Scientific Departments. Management of branch libraries in Departments. Dealing with enquiries for information.
Group A	Space and Weapons Departments Special responsibility: Reports processing and announcement
Group B	Aerodynamics and Structures Departments, Flight Systems and Departments not in A and C. Special responsibilities: Subject classification, Cataloguing code
Group C	Engineering physics, materials, instrumentation and trials, radio and navigation departments. Special responsibility: Reading room services.

This type of system could be used effectively in an organization which is decentralized.

At UKAEA Risley, on the other hand, professional staff are divided into library staff and information staff and this division reflects their duties. These duties do however encompass all potential users on the site rather than just specific groups. At Risley there is no departmental library structure and the information unit is centralized.

4.3.2 Qualifications

Professional staff should either be qualified librarians/information scientists or subject specialists in a relevant field. In a large unit, if possible, staff of both types should be employed. In the past few years there has been an increasing trend for scientists and technologists to follow their degree courses by a diploma or degree in librarianship or information science. The combination of these two qualifications is a desirable asset.

If the information centre has a specific library function then a qualified librarian is in general the best person to organize this facet of the centre. Similarly if a combination of the ability to run a library and enquiry service and knowledge of a wide range of subjects is required then a librarian trained for this type of work gives the best contribution. The information function can be served by either information specialists or librarians but in many information centres there are jobs which require an in-depth knowledge of a particular subject and in this case subject qualifications are absolutely necessary. In the field of defence and aerospace a degree in the physical sciences, e.g. physics, chemistry, computer science, fluid mechanics, electronics or mathematics or in an engineering science, e.g. mechanical, electrical or aeronautical engineering would prove useful. It is true that some information centres do function without subject specialists, even in a very technical field, but then very close contact with the users is necessary so that the best use can be made of the resources available.[6] The type of service required will guide the selection of staff and their qualifications.

The reading knowledge of one or more languages apart from one's native language, e.g. French, German, Russian or English would be an asset. Although the staff may not be expected to do translations such a qualification would assist in documentation work and information retrieval.

It is always an asset to an information centre to have members of staff who have previous experience in information work. Certainly when appointing to senior posts it is advantageous to choose an applicant with experience. He will bring a knowledge of techniques used in other centres, the contacts which can be used to obtain information, successes

and failures of various library and information systems and his wealth of personal information which can only be built up over a period of years. He can advise and assist the information manager to a high degree particularly if the manager himself is not an information specialist.

It is also desirable to have some staff who have experience in the subject concerned and especially of its practical application in the particular company or organization being served. Some companies have tried a policy of secondment for a period of years, e.g. from a research department, but these have not always been successful. The staff concerned have in general found information work more interesting and have not wanted to return to their former roles.

Professional staff who are in regular contact with the users must be able to communicate effectively and easily with all types of people. Thus they can ascertain their requirements without embarrassment or duress, formulate search strategies to answer their queries and promote the good relations of the information centre. Initiative, determination, and versatility are essential as the staff will need to work with the minimum of supervision but frequently under pressure in a constantly changing field. Personal appearance is also important as this gives an overall impression of the efficiency and smooth running of the unit. Although the qualities discussed above are essential in a user-orientated environment there is also a place in certain information centres for the person prepared to do routine, repetitive cataloguing, indexing and abstracting work for long periods who is motivated not by the variety of their work and user contact but by the pleasure of producing well documented material.

4.3.3 Training

There are two types of training: initial and further training. The latter is for staff who wish to extend their knowledge of information work or take on extra responsibilities.

Most initial training will take place within the information department on a person-to-person basis.[75] This will show the new member of staff how to carry out the tasks which his job involves and the problems associated with it. He should, however, also be made aware of the interrelationship between his job and those of other members of staff. It is essential that he understands the policy and objectives of the information centre and what its services are. It can be several months before a new member of staff proves to be an effective worker in the information centre because of the intricacies of the job he has to do.

A new member of staff should, if possible, attend a general induction course run by the company or organization which employs him. This course should make him aware of policies, organization and objectives of the organization and the work being carried out. Efforts should be made to introduce him to as many potential users as possible.

It is possible for new members of staff to attend external training courses organized by professional associations and educational establishments but these can only be very general, e.g. an introductory course to senior library work. In general external training courses should be retained for use by existing members of staff who require further training. The objective of further training should be to enable the individual to carry out his role more effectively. Thus he may attend courses on management techniques or recent developments in library and information work. The professional associations and Schools of Librarianship organize a wide range of courses at various locations. These are well documented and advertised in the literature of librarianship and information science. In the UK for instance, examples are courses run by BLLD, Aslib, NRCd and the on-line hosts e.g. BLAISE, DIALOG, etc.

When a new information centre is being established or if a large number of existing staff need to know about a new development, e.g. on-line information retrieval, it is possible to arrange for on-site courses to be given by these organizations and it is of course more cost-effective to bring one lecturer to the trainees, than vice-versa.

Attendance at conferences is important and should be encouraged as it is a convenient way of making contacts in the information world, exchanging ideas and keeping abreast of new developments. Staff should also be encouraged to read the literature relating to their work, e.g. Journal of Documentation, Information Scientist, On-line Review and the journals of professional associations which record new developments and other information workers' experiences.

4.3.4 Employment Conditions

In a company the number of hours worked should be exactly the same for the information staff as they are for any other member of staff and will depend on company policy. However, if 'flexi-time' operates in the company it may not be possible for the information centre to allow its staff to participate in this. The information centre provides a service and users expect it to be able to give that service at all times that they might be there. The centre needs a certain number of staff to be present at any one time to provide that service and to ensure overall security. With a limited number of staff in his centre the information manager may decide that it is better to provide a full service for a certain period, e.g. 8.30 a.m. – 5 p.m. even though the users may work from 7.30 a.m. – 6 p.m. In a larger organization with many more staff it may be possible to allow 'flexi-time' but the manager must ensure that a certain number of staff are available at all times to give a user service during the period that the centre is scheduled to be open. It often occurs that staff naturally form themselves into those who prefer to start early or work late. The same care must be taken in the arrangement of holidays and lunch-breaks in order to provide continuity of service. The use of 'flexi-time', therefore, is dependent to a great extent on the proximity to the user.

Salaries paid to professional staff will depend on the grade at which they are appointed and the relationship of this grade to national or company scales. For instance staff in government and government related information centres in the UK are paid according to Civil Service scales. The grade determines the salary and in companies in particular, information posts tend to be graded lower than research or engineering posts. The Special Libraries Association in the United States carries out an annual survey and in 1978 the average salary quoted was $18,400 (Ref.76).

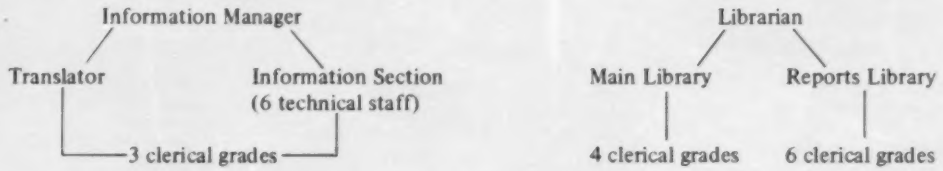
Prospects for promotion in an information centre are in general limited because many staff are needed to perform information work at a technical level but only one or two people are needed at managerial level. The professional/technical grade is generally the career grade for an information officer. The possibilites for promotion occur outside the centre and in other companies or other departments. These possibilities will probably not be in information work but in management or computing. Staff should be made aware of this limitation on promotion. It is advisable to choose some staff who will obviously want to be career information officers and others who are 'birds of passage' through the information centre. The career prospects of the stayers are then enhanced, there will be a wider range of ages among the staff and there will be a widening field of interest.

4.4 Clerical Staff

The professional work in any library is supported and complemented by the clerical staff and their contribution is of great value. The clerical staff can help to make the services of the centre truly effective and they should be encouraged to rise to the best level of work of which they are capable.

4.4.1 Functions

These will be varied depending on the type of information centre but typical jobs in a fairly large library/information centre, with a stock of about ½ million reports, which may employ about 13 staff in clerical grades, are shown below:–



In the example shown the library and information sections are separate entities and the reports are administered separately.

The four clerical staff in the main library could be involved in the following tasks:–

(a) 1 on inter-library loans
(b) 1 on ordering
(c) 1 on periodicals – receipt, distribution, etc.
(d) 1 at higher grade in overall command doing cataloguing, controlling binding, etc.

At any one time two of (a), (b) or (c) should also be performing counter services as well as their own duties.

The six clerical staff in the reports library could perform the following tasks:–

(a) Supervisor who oversees the work carried out by the other staff, assists with any problems they may have and who may take part in the drafting of internal reports.
(b) Acquisitions clerk who sees all reports as they come into the library, sorts them into types, adds them to stock and marks up accessions cards.
(c) Archivist who deals with the downgrading of reports and reclassification problems.
(d) Distribution clerk who distributes internally generated reports to other organizations.
(e) Inter-library loans clerk.
(f) Counter-service clerk receiving requests for reports from users, getting them from stock and returning them and filing reports.

The clerical staff in the information section will act as back-ups to the professional staff who will generate abstracts for information bulletins, indexing terms, etc. This material will either have to be typed out manually or input to a computer either on- or off-line and these tasks will be carried out either by typing staff or clerical staff/data processors.

In a large national reports centre the work of the clerical staff will be concentrated on the recording, distribution, requests for and preparation of publications concerning the reports held by the centre. They will generally be responsible for the cataloguing of these reports and maintenance of the author/title catalogues. The filing of catalogue cards will be

their responsibility although the professional staff will give advice on their arrangement. They will deal with simple enquiries and the preliminary work on complex enquiries but should be trained to know when to hand such enquiries over to the professional staff.

In most information centres where the jobs are officially graded at the same level an informal hierarchy will develop and the jobs will be naturally graded by the staff themselves. In some ways it is desirable to move staff around so that they can do all the jobs necessary in the centre and to provide an overlap at holiday times or in cases of sickness. Good relations between the staff and an understanding of how each of their tasks interrelates fosters this type of attitude. If there is no demarcation between jobs then job restructuring is a possibility on an amicable basis.

4.4.2 Qualifications

Formal qualifications are not necessarily indicative of how someone will cope with the clerical tasks in an information centre. The acquisition of diplomas and school certificates is one way of measuring intelligence and capabilities of a candidate and ideally they should possess the relevant documents. Evidence showing literacy and numeracy is desirable. In general clerical staff are young girls who may have joined the organization straight from shool and this may be the only way of assessing their potential. The other type of clerical staff are married women who go back to work after their children have grown up. It may be more difficult for them to produce documents relating to their educational performance. The type of work they did previously or whether they have been on a refresher training course, e.g. in clerical duties, typing, etc. will be of more importance. References play an important part in assessing the capabilities of prospective clerical staff. The knowledge of other languages is helpful in certain duties but is in no way essential. Neither is previous experience in information work although previous experience of office work can be useful.

The personality and character of the clerical staff is important particularly if they have contact with the users. In an industrial information centre the clerk on counter duty is generally the first member of staff that the user encounters and her attitude to his requests determines his opnion of the centre. Her appearance also gives an overall impression of the unit. For those staff involved in working under pressure in backroom jobs the ability to get on with one's colleagues is essential. They must also be prepared to do routine, repetitive tasks for long periods with a high degree of accuracy. The aptitude requirements of clerical staff have been discussed by Goldstein and Sweeney[77] and are gathered together under the headings of linguistic, logical, personal and organizational abilities. They also emphasize the need for dexterity and strength which is necessary to accomplish the physical aspects of the job and the ability to realize when to refer a problem to higher authority.

4.4.3 Training

In order to do their jobs well clerical staff must receive good in-house training.[75] This training should be in the job that they will do specifically but should also show them how their function relates to others. Their work will then be more interesting and hopefully will be done with more thought and care. Opportunities should be fostered for clerical staff to make occasional visits to laboratories and users to obtain a feel for the value of work they do. They should also be encouraged to do any training courses for library assistants which are available. There may be day-release courses at Universities or colleges which will give them a professional qualification. However care should be taken in encouraging clerical staff to attend these unless the organization they work for is prepared to consider promotion of the person concerned on obtaining this qualification.

4.4.4 Employment Conditions

The conditions of work relating to hours will be the same as for professional staff and the same restrictions on 'flexi-time' may occur. 'Flexi-time' can be a great inducement in acquiring clerical staff particularly if the staff are married women who can accommodate their other responsibilities around a more flexible working day. Salaries will depend on whether the organization is bound by national policies or not. In industrial information centres the clerical staff will be paid the same salaries as clerical staff in comparable functions.

4.5 Ancillary Staff

Several different types of supporting staff will be concerned with the operation of an information centre and will include computer staff, security personnel, typists, machine operators, cleaners, maintenance personnel, telephonists etc.

4.5.1 Employment Conditions

In some organizations ancillary staff may not be directly recruited by the information centre but provided from the organization's general staff complement. In a national information centre the ancillary staff may be employed by one or more Government departments and unless the centre shares a building with another government organization their responsibilities will lie solely with that centre. Their conditions of employment will be determined by their employers but may be subject to the local conditions relating to the information centre and the manager of the centre will need to monitor their performance. Since these staff are not recruited by the information manager it is essential that those responsible for their recruitment understand that unsuitable staff must not be drafted to the centre and that it is necessary for substitutes to be provided when the normal ancillary staff are on holiday or ill.

4.5.2 Functions

In a national centre where large stocks of paper reports are held it may be necessary to employ a group of ancillary staff, called paperkeepers, whose sole task is to retrieve and file reports. This task is particularly important especially if reports are kept in closed access in remote storage areas. These people know their own system and should be allowed to maintain it with a small amount of guidance and advice from professional staff.

Although it is helpful if some of the professional and clerical staff can type it is likely that some typing staff will be employed, whatever the size of the information centre. In a large centre they will probably be organized into a centralized typing pool which does work for all different sections of the centre, but in a small information centre it is more likely that they will work among the people who generate their work.

Cleaners are important members of staff in an information centre which houses items on open shelves. All material gets dusty and needs to be cleaned on a regular basis. It must be handled with care and the integrity of report collections in particular must be maintained. In a centre which houses classified material cleaning operations will have to be supervised at all times. If this cleaning is done out of normal working hours then suitable arrangements will have to be made for supervisors to be present.

Whatever the function that a member of the ancillary staff performs he or she should be treated with respect as a valued member of the information centre and if he or she performs well should feel that this performance is recognized.

4.6 Security Clearance of Staff

This should not be the concern of the information centre but should be dealt with before arrival either by a company personnel department or a relevant Government department. Staff should be cleared in general to a certain level but the information manager may need to ensure that staff at lower levels never have access to classified documents. Cleaners and maintenance men working in a security area should never be left unaccompanied in the presence of classified documents. Further information on security aspects is given in Section 10, Vol.IV of this Manual.

5. BUDGET

5.1 Initial Expenditure

A certain amount of money will be allocated to the information manager to establish his information centre and the amount will depend on the initial calculations which he has presented and the degree of funding which the parent organization feels that it can provide. The initial calculations should have considered the requirements for stock, equipment, furniture, accommodation, services necessary to set up the centre and manpower requirements for the actual establishment of the centre. These will form a large part of the initial expenditure but there will be a substantial amount of money needed to cover the costs of installing services, modification of the building and movement of stock.

The manager may have to review his initial costs and make adjustments if the initial funding is not sufficient to meet all his requirements. He will have to use all his skills to assess where he can make cuts and cause least damage to the service he was hoping to provide.

5.2 Recurrent Expenditure

The information manager should draw up charts of recurrent expenditure alongside his plan of initial expenditure so that the parent organization will be aware of how much they are going to have to contribute annually to maintain the service that the information centre is giving. In particular great thought should be given to staffing costs because the provision of a service depends on adequate staffing. The final decision to establish a centre should be based on all this knowledge.

Recurrent expenditure will probably be concerned with the following factors:–

- Salaries.
- Publications (Books, periodicals, reports, patents, trade literature, etc.).
- Information services.
- Computer time (Information retrieval).
- Rentals, e.g. Reprographic machines.
- Depreciation.
- Printing, Stationery.
- Binding.
- General overheads.

Costs will have to be collected on all these factors.

In some organizations salaries are not considered in the budget of the information centre but are taken to be part of the company budget. Similarly charges for services such as cleaning, maintenance of equipment, etc. may be borne by the company rather than by the information centre. In many companies, however, and certainly in national organizations, all the factors listed may have to be considered in the information centre's budget. If this is so the manager will have to balance the amount he can allocate to staffing costs, stock and other services. He should be aware of his operational costs and use them in planning and controlling the various activities for which he is responsible. In order to maintain staffing levels and acquisition of stock he may have to curtail other services. Provision of an extra member of staff may mean cutting back on stock. It is often at this point that an assessment of the methods operated in the centre is done. Changes in the way of working may be beneficial.

If the manager's recurrent budget only relates to expenditure stock then we will only have to assess how much he can spend on the various types of literature purchased for the information centre. This is not an easy task and again depends on whether the parent organization has the policy of maintaining the increase in the recurrent grant at the same rate as inflation. Very few established information centres, even those which obtain a large amount of their stock as reports on gift or exhange, are able to maintain their purchasing power at the present time. This is due to the considerable increase in the price of printed material in recent years. Periodicals and particularly abstracting journals can be very expensive. One aeronautical library, for instance, reports that its expenditure on printed publications was £60,000 in 1971/2 and was £157,000 in 1979/80 despite the fact that it had cut the number of journal titles which it receives by 200. Careful thought will have to be given to the best way of allocating expenditure on stock and the information manager will have to keep usage constantly under review. There has been a proliferation of new scientific and technical periodicals in the last few years which continues unabated. He must therefore make allowances for the provision of new titles. He may have to cancel other titles to purchase these.

Ideally enough money should be available each year to buy all the necessary stock and a little extra to buy items which are desirable. Balancing of the budget is not an easy task but is essential to the well-being of the information centre. The budget should be controlled carefully because undoubtedly the manager will be required to justify the cost-effectiveness of his system.[78]

5.3 Non-recurrent Expenditure

Most information managers will be faced with the requirement for new equipment during their period of office. Technology is advancing so quickly that new techniques are being applied to library and information work every year, and the methods of disseminating information are constantly changing. Therefore the provision of e.g. VDU terminals, microcomputers, word-processors, microform readers, will have to be budgeted for. It is impossible for such equipment to be purchased out of the recurrent grant even though a small allowance is usually made for depreciation of equipment in this grant. A separate grant will have to be negotiated with the parent organization and the purchase of the equipment will have to be justified. The manager will have to show the necessity for[79] and cost-effectiveness of their acquisition.[80] A model has been proposed for[21] the investigation of the cost-effectiveness of interactive on-line searching and has been used as an aid towards the justification of expenditure on the required equipment to senior management of a large company.

6. STOCK

6.1 General

The type of stock acquired by the information centre will depend on its aims and objectives. If it is to function as a national reports centre then the majority of its stock will be report material. The rest of its stock will be reference works related to its involvement in information retrieval or enquiries about report literature. On the other hand if it is to supply information to a company or industrial organization then its stock will be very varied and will include books, periodicals, reports, general reference works and possibly patents, trade literature, commercial data and standards. The format of this stock will vary from printed copy to all types of microform and will probably include some computer print-out.

The subject range of the stock will also depend on whom the information centre is to serve and in what depth. If a reports centre is to serve the whole of the defence field then the stock collected will need to cover all possible subject requirements in this area. However if the information centre is part of an electronics company then the material available will be slanted towards literature coverage in all aspects of electronics. Some organizations only require the information centre to serve their research and development section whereas others want coverage of management and commercial sections too.

The quantity of stock will depend on finance and space available and may be determined by the ease with which material can be obtained elsewhere by an inter-library loans system or reference to a nearby library.

6.1.1 Acquisitions in General

The acquisition of stock other than reports is fairly standard practice in any library. It can either be handled direct

between the order section of the centre and the publisher or an agent can be used. It usually pays to deal with a bookseller large enough to supply items from stock. If stock has to be acquired from another country then the assistance of an agent can be useful especially when there are problems over payment transfers. If an agent is used one has to be found who is efficient, speedy and trustworthy. Most scientific and technical literature needs to be consulted at short notice and long delays in the acquisition of stock should not be tolerated. An efficient ordering system is essential and the member of staff in charge of this service should be chosen carefully. This person should be provided with sufficient up-to-date bibliographic tools to facilitate the accurate ordering of published works. Whenever possible and providing the finance is known to be available standing orders should be placed for recurrent items.

Recommendations for acquisition of material for the information centre will mainly come from users but overall responsibility should lie with the information manager and his staff. See also Section 1, Vol.I of this Manual.

6.1.2 Recurrent Acquisitions

Material acquired can be divided into non-recurrent or recurrent. Individual books, reports, patents, standards and certain general reference works can be considered as non-recurrent acquisitions. Many information centres will find that most of their stock e.g. periodicals, report series, abstracting journals, are recurrent acquisitions. The decision to acquire such items has to be taken with care because one has little control over the quantity of material published. This is irrelevant if the material is being received as a gift and space is available to store it, but is very relevant if the items are having to be paid for. It has a marked effect on the budget particularly if the subscription to a periodical changes at short notice because of variations in the exchange rate or if an extra volume has been published. Similarly the acquisition of recurrent material has to be monitored carefully to ensure that the items actually arrive and on time. Staff and equipment will be necessary to check this in addition to the staff involved in ordering items.

With the increase in technology in information work the manager will have to decide whether to hold a large number of individual periodical titles. He may decide to rely instead on abstracting journals or indeed on computer produced data bases for information retrieval.

6.1.3 Non-current Acquisitions

The information manager may find it necessary at some time to acquire non-current items. This may arise when an information centre is being established or when there is a change in subject requirements by the users. Acquisition of older material can be difficult particularly as certain books and even individual issues of periodicals can go out-of-print almost as soon as they are published. In many countries, particularly in Eastern Europe, only the number ordered are printed. Publishers are becoming increasingly diffident about reprinting unless they are absolutely sure of selling all the reprints. In general they are preferring to supply items in microform.

The manager is then faced with several alternatives: he can try to obtain the items through the second-hand book/periodical trade in printed form, he can purchase them in microform from the publishers or he could try to obtain them from a central organization which collects together surplus items from other libraries. Individuals and organizations frequently sell off their collections of books and periodicals either personally by advertising in relevant journals or to second-hand dealers. The British Library runs a gift and exchange scheme through which both British and foreign libraries can either acquire or dispose of stock.[81] Monthly circulars inform librarians of material available and requirements. The alternatives that the manager chooses will depend on the nature of the material, the users' attitude to microform and the varying costs.

Microform has the advantage that it is complete and in good order. Sets of printed material purchased may have certain items missing or they may not be in a good state of repair. Certain items such as books are not easy to use in microform because of the length of time one has to spend at the viewer. In some cases such as the acquisition of older sets of reports the manager may have no choice. There is an increasing trend towards organizations only keeping one copy of any report and supplying requests for copies of it in microfiche. For example the complete set of NACA reports has recently become available on microfilm from NTIS.

6.1.4 Classified Material

The acquisition of classified material, e.g. reports and military specifications will depend on the status of the centre and its right to possess such items. This right will have been demonstrated either by its terms of reference when it was established or by the work in which its parent organization is involved. If a company, for instance, has been carrying out Government contract work on a defence project it will normally be entitled to receive relevant classified documents from the National Centre. A national information centre in the defence/aerospace field will have negotiated to receive classified unpublished literature from as many sources as possible, usually under 'Exchange Agreements'. Further information on this subject is given in Section 10, Vol.IV of this Manual.

6.2 Resources Available

6.2.1 National Reports Centre

The bulk of the resources available will be reports and specifications. In addition to these it will be necessary to hold certain abstracting journals e.g. NASA-STAR, Electrical and Electronics Abstracts, International Aerospace Abstracts, which can be used by the reports staff when answering queries and checking details about reports requested. General reference works such as dictionaries, and directories, e.g. Dictionary of Report Series Codes, will also be needed in this work. Very little other stock will be needed unless the centre intends to function as an information centre doing literature searches outside its own reports material or if it is to be used as a library. If this is the case then it will need the same range of stock as a company information centre.

6.2.2 Industrial Information Centre

The book stock may have to cover aspects of government administration, management, commerce, training and law, as well as the specific technical subject, e.g. nuclear engineering, electronics, aeronautical engineering and its coverage should be fairly extensive and current.

Periodical titles held should range from the transient newsy ones to those covering research in depth. Their coverage should be world-wide and in many languages. Covef-to-cover translation of certain foreign language periodicals are available, e.g. Russian into English and the language chosen should be that which is going to be most useful. However it should be remembered that a time delay sometimes occurs in translation. The number of titles held could range from about 30 or 40 fundamental journals up to 1500 titles depending on the size of the organization and finance available. The subject coverage will be mainly concentrated on the subject field being researched but some management journals may be held. The choice of titles will be determined by user needs and in general several users should need to use each title to justify expenditure on it. There are occasions, however, when one particular periodical covers exclusively the work of only one user and an exception could be made for this.

Abstracting and indexing journals are in general expensive but they are usually cost-effective and great assets to any information centre. The titles chosen should cover as wide a range of subjects as necessary and those abstracting journals with an extensive journal coverage are to be preferred to those with a very limited coverage. The former are of course more expensive than the latter and finance may dictate which titles can be chosen. Some examples in three different subject areas are listed below:—[82]

Nuclear Engineering	*Aerospace*
Chemical Abstracts	NASA-STAR
INIS Atomindex	R & D Abstracts
Energy Research Abstracts	International Aerospace Abstracts
Nuclear Science Abstracts (non-current)	Index Aeronauticus (non-current)
Engineering Index	NTIS Govt. Reports Announcements
NTIS Govt. Reports Announcements	Metals Abstracts
R & D Abstracts	
Physics Abstracts	*Electronics*
Industrial Wastes Information Bulletin	Electronics Abstracts
ANBAR	Computer and Control Abstracts
EURO Abstracts and Transatom Bulletin	R & D Abstracts
Metal Abstracts	NTIS Govt. Report Announcements
Electronics Abstracts	Physics Abstracts
Computer and Control Abstracts	British Technology Index

A useful list of abstracting periodicals is available in the FID publication 'Abstracting Services', Ulrich's international periodical directory, 'KWIC index to the English Language abstracting and indexing publications currently received by BLL' and in various reference works dealing with specific subject areas. In general the majority of abstracting journals originate in the USA and abstracts will be in English. Coverage of the literature is however worldwide. Other major abstracting services are the All-Union Institute for Scientific and Technical Information of the USSR (VINITI) which publishes 'Referativny Zhurnal' (many sections) and the French 'Bulletin Signaletique' published by Centre Nationale de Recherche Scientifique (CNRS).

A collection of standard works in the subject field should be maintained. This collection will greatly assist the staff and users in answering quick queries. It should include bibliographies, directories, foreign language dictionaries, encyclopedias, and major reference works. Important reference works in any subject field involved with report literature are the 'Dictionary of report series codes' and 'Directory of engineering, scientific and management document sources'. It may also be useful to keep certain standard textbooks and monographs in the reference collection.

Reports will form a large portion of the stock and will probably be held in certain series specific to the subject area, e.g. NASA and AGARD report series for aerospace, the United States Atomic Energy Commission (USAEC) series ORNL and UCRL in nuclear energy. As many series as necessary should be readily available in stock.

Copies of patents and standards relevant to the work of the organization should be held either in the information centre or in a location where they are being used constantly. The information centre should be aware of their existence and have control over them if possible. The information staff should be aware not only of standards applicable to their own country but also of international standards such as those of the International Organization for Standardization (ISO) and the International Electrotechnical Commission (IEC) and those of other countries, e.g. British Standards Institute (BSI), Deutsches Institut für Normung (DIN) and Association Francaise de Normalisation (AFNOR).

Trade literature can be an extremely useful and detailed source of technical information. In certain subject areas particularly electronics it is highly organized and should be treated as part of the library's total collection.[83] The information provided will include performance data, operating characteristics, materials' properties and can include reports on the application of the product. It is difficult to organize into formal collections because it is easily and readily available to bona fide enquirers direct from manufacturers and the recipients regard it as expendable. It is however possible by having a member of staff responsible for the acquisition of trade literature to put together a collection. Certain electronics companies do maintain working current collections. If such an approach is not feasible then buyers' guides and trade directories, which list names and addresses, combined with a classified section in which manufacturers are listed under product and service headings, can be collected and maintained. Alternatively it is possible to subscribe to an organization offering a service in the provision of trade literature. Many are or were available but the most enduring is Technical Indexes Ltd., whose services have been discussed by Ford.[84] The system which serves various subject areas is available in printed or microform and is backed up by a comprehensive and regularly updated printed index (see Figure 15). This enables the user to find very quickly the catalogues on a particular product or the catalogues of a particular company.

There are numerous other types of documents which might be held in the information centre but examples are official Government publications, EEC documents, collections of statistical data, etc. Information on how to obtain information in different fields of technology is given in Lecture Series 69 (Ref.85).

6.3 Stock Management

Good management of stock depends on having enough staff to manage it. The stock should always be catalogued, indexed and maintained in good order. The arrangement of the stock is important and should be checked frequently. Great care should be exercised in shelving items, particularly in report sequences so that the integrity of the set is not broken.

6.3.1 Loans/Reference

The information manager must decide which type of service i.e. loans, reference only or a combination of the two best fits the needs of his users. It is likely that a combination of the two will result with the book stock, patents, standards and reports being nearly all borrowable and the periodicals, abstracting journals and general reference works being confined to the information centre.

An efficient and effective loan and recall service must be operated and at no time should the whereabouts of any item be unknown. A reasonable loan period is one month with renewal if necessary. The borrower should always be encouraged to sign personally for his loan even when the loan itself is carried out mechanically. One library, at least, issuing material by computer has reintroduced this feature into its loan system. This overcomes many problems later when the borrower cannot remember taking out the item but on seeing his own signature against the loan is prepared to search for it. A simple borrower's card located inside each item or corresponding to each item is all that is necessary.

In an earlier section it was suggested that space problems could be alleviated by allowing certain items to be on extended loan to specific users. Very specialized journals only used by workers in one department could be kept in their department or standards and patents only used by individual researchers could be held by them. However, all these items are still the stock of the information centre and are the responsibility of the head of the centre. He must therefore ensure that an efficient record system is kept of such loans so that items can be recalled at any time. Company policy should be that an employee's contract with the company is deemed not to have terminated until the librarian's authorization has been received that all items on loan have been returned to the information centre. Such a policy is vital in the case of classified documents.

The confinement of most periodicals, abstracting journals and reference works to the centre is essential. In some organizations library staff provide a copying service, requests for photocopying are sent to a centralized reprographic department or users can do it themselves. The latter needs less staff time but the manager should ensure that the users are abiding by the laws of copyright[24,25] relating to the material being reproduced for which he is responsible.

Policy over binding of stock varies. Because of heavy usage or costs it is sometimes impossible to send certain periodicals for binding although it may be desirable to do so to preserve them. Priority should be given to abstracting journals but speed is essential. Binding of periodicals is not really necessary providing the collection can be maintained in entirety. Location of non-current parts on closed access is one method of preventing theft and misuse although it does involve more staff time than does users locating their own requirements.

S20

Aluminium & aluminium alloys

for Flexible tubes see chart X90

film: support film, cassette, track, frame

| | Type | | | | | | | | | | | | Section | | | | | | | | | | | |

6.3.2 Display

New additons to the information centre should be displayed to alert users to their existence. New books could be on show for one or two weeks and the current journal parts displayed until the next issue is received. In general, reports, standards and patents will not be displayed but will be stored after receipt. Individuals should be informed immediately when items ordered specifically for them arrive. When information staff acquire an item which might be of interest to a user they should inform the possible user personally of its arrival. Displaying items and informing users of their existence assist greatly in encouraging staff to use the information centre's facilities and enhancing its reputation.

Another form of display is the current awareness bulletin whose preparation has been discussed in Section 6, Vol.II of this Manual. This is the general method of informing users about the existence of reports and other items.

6.3.3 Storage

Books, abstracting journals and reference works should be stored on open access under conditions which enable the user to use them easily. Books should be arranged in a logical sequence classified by subject matter to aid browsing and be uniquely identifiable. There are several classification schemes which can be used but UDC is favoured for scientific and technical works.

Non-current periodicals can be stored on open or closed access depending on library policy and the staff available to retrieve items for users. Unbound parts should be stored in cardboard containers, each of which holds 6–12 issues, rather than being allowed to stand freely on the shelves. Individual volumes can thus be designated. If users find periodical parts for themselves then it is preferable to arrange the periodicals in alphabetical order of title within subject divisions. In closed access storage subject divisions do not need to be maintained and periodicals can be kept in any order providing the exact location of every title is known to the staff.

Reports will be stored under open or closed access conditions depending on the decision to shelve all reports (classified and unclassified) together or separately. See also Para. 1.3 Section 10 of this Manual. Reports can be shelved in several different sequences:–

- Subject matter.
- By originating body.
- By report series code.
- By accession number.

Classifying each report and shelving it according to its subject matter was favoured many years ago when the volume of report literature was small.[86] It assumes that there are staff available to classify each report received, that reports are only on one subject and that expansion space can be left in each subject area. Shelving reports by originating body can cause problems because one organization may publish reports in several different series and these may be difficult to keep apart. These two methods have fallen into disfavour and the other two methods of storing reports are currently used. Both methods have advantages and disadvantages.

The former requires little processing to be done when the report initially arrives and aids retrieval because no reference needs to be made to a catalogue if the report code and number is known. This is not to say that all organizations who use this method of storing reports do not catalogue and classify them initially. Its main disadvantage is that expansion space has to be left at the end of each report code series and as it is difficult to judge expansion rates some moving around of stock in the storage area is usually necessary. Also older and recent items will be randomly distributed throughout the whole collection.

The latter method, whereby an accession number (part of a running number sequence) is given to each report when it is received by the information centre requires staff to be available to catalogue and classify each report on arrival. Access to any report has to be *via* an author or subject catalogue which will give the accession number of that report. The main advantage of this method is that the only expansion room necessary for the report collection is at the end of the sequence and older material is all at the beginning of the sequence. It is much easier to move part of the collection to another area on a date basis by this method if space problems arise.

Patents and standards will normally be stored in numerical order within their country of origin or specification code. This information is the normal designation given to this type of material and offers the easiest method of retrieval.

Trade literature if it is being maintained as a collection should be stored in an accessible, ordered manner. It can be stored in alphabetical order of manufacturer's name in a general sequence or in distinct subject divisions. The latter is preferable as users are frequently looking for different manufacturers' catalogues for one item of equipment. Each item received can be noted on a card in an author catalogue (by manufacturer's name) and in a subject catalogue by type of equipment. Since trade literature is frequently in flimsy paper form it is often advisable to keep it in ring binders or boxes e.g. all information from manufacturers whose name begins with A can be kept in one or more binders in alphabetical order of manufacturer's name. The binders or boxes could be numbered in a running number sequence encompassing all subjects, e.g. 1–40, switches; 41–90, circuits; 91–130, relays. Any item required from a particular manufacturer could be located by use of the author or equipment indexes which will refer the user to a specific numbered

binder. This method of storage does have the disadvantage that sudden expansion in the middle of the numbered sequence will cause storage problems and even the necessity for extra binders. These will have to be given suffixes to accommodate them at the correct position and some movement of stock will be necessary. It is likely that two sequences of trade literature will have to be maintained: current and outdated. Catalogues relating to outdated equipment which is still in use are essential and cannot be disposed of. They should be stored in the same manner as current catalogues.

6.3.4 Disposal

The information manager needs to be careful in deciding what to add to his stock but he also needs to exercise great care in deciding what to dispose of or to discontinue.

In a national reports centre, where the aim is to maintain a working collection of relevant reports, disposal initially will be restricted to extra copies of reports or irrelevant material although ultimately weeding of stock, to official archives will be necessary.

The criteria the information manager uses for disposal must be usage, subject relevance, ease of obtaining items elsewhere and degree and quality of indexing of items. In deciding whether to dispose of back copies of periodicals it is impossible to use a general cut-off date as usage differs so much from one periodical to another. Also some periodicals are very inadequately indexed in any abstracting journals and if these periodicals are being used at all it is better to retain them. It is essential that the information staff are aware of how often and in what way their stock is used. Before any item is disposed of it is important to find out whether it is unique and whether it can be obtained elsewhere should the need arise. If an item is unique then it should either be retained or sent to an organization or central depository who can use it.[87]

If storage problems arise in the centre itself then possibly extra storage space in a different area could be found. Less used, older material could be moved to this area. The number of items needing to be retrieved from this area would indicate how essential it was to keep the items themselves or whether they could be disposed of. The manager should also consider whether methods of storage other than those in operation e.g. mobile storage stacks might help his space problem or whether necessary items could be held in a different form, for example microform. It may be desirable to purchase microfilm copies of certain periodicals or even abstracting journals to replace printed copy. Several successful instances have been reported.[88,89] Shelf space is regained combined with user satisfaction at the retention of the material. Microfilm copies of all reports held could be produced[22,23] and the microfilm held in the centre itself while the printed copies are stored in a remote area. Several companies have done this for their own internally generated report sequence and the use of 16 mm film in cassette form has been shown to be a good medium for this purpose.[22] External reports available in paper copy, which are not heavily used, could be converted to microfiche form.

Budget problems may force an information manager to cancel certain periodical titles from his own stock. There will undoubtedly be borderline cases where maybe one or two members of staff use a particular periodical. The information manager could then try to persuade the relevant department to finance the purchase of this periodical and to hold it in their own department. He would of course keep a record of its existence within the company.

The existence and operation of an efficient inter-library loans service is a vital consideration in stock management and disposal. The British Library Lending Division at Boston Spa in Yorkshire offers such a service and has many foreign users.

6.3.5 Security of Stock

Access to classified documents is on a need-to-know basis and this must be strictly enforced. Some classified reports will bear a listing of people who can see them whereas others will bear a listing of classification and only people who have been security cleared to this level and who have a validated need-to-know can see them. This classification should have been designated by the originator and the information centre must deal with the items in the correct manner. Further information on procedures for processing classified documents is given in Section 10 of this Manual.

7. MECHANIZATION

'Library automation is not a panacea. It does not solve all the problems faced by librarians. But one thing is certain, automation in the form of data processing, offers the only opportunity to stop the present rise in costs, absorb growing work loads and provide additional services'. Warheit

7.1 Advantages and Disadvantages

In the 1960s it was realized that library automation might help to solve some of the librarian's problems which had arisen from economic pressures. In any costing exercise staff costs make up a large portion of the total and are constantly increasing although there may be no significant improvement in productivity. Such an improvement, because of the nature of the work, is very difficult without a complete change in the methods of working.

There are some routine tasks in an information centre which are repetitive and tedious. For instance, in a large reports centre the maintenance of a manually-produced card catalogue, the preparation of an announcement bulletin, the production of reports and the distribution of reports all involve routine clerical tasks. Such tasks can be mechanized effectively and the transfer of repetitive clerical tasks from staff to machine has been going on for several years.[90] In an industrial information centre the same tasks plus ordering, stock control, circulation of periodicals, etc. could also be mechanized. Because of the increase in the volume of literature the number of staff needed may not be cut but at least they may be able to cope with the increased workload.

When the information manager is considering whether to mechanize certain operations in his centre he should look at the advantages in terms not only of costs, speed of output, ease of operation, etc. but also in relation to the quality of the information services concerned. Mechanization should always bring about an improvement in service and it may be that a certain operation can be made more effective by a change in method rather than mechanization. If a system is computerized because it is not working too well there is no guarantee that computerization will improve it. It is best therefore to analyse the system thoroughly and look at its working objectively before rushing into mechanization.

Mechanization efforts in relation to computers may require retraining of staff and even the employment of specialist staff, e.g. computer programmers. These changes and their overall effect on the information centre should be kept in mind. It is important to remember also that few items of equipment have been designed with libraries specifically in mind. Most are items of general office equipment which will have to be modified to library applications. The manager may need some inspiration to see how this can be achieved.

Despite the speed of the computer in handling information, a new computerized system may not be as effective as the old manual system. For example, it is possible for the time needed to prepare and input information to the computer to be longer than the time originally taken to do the whole system by hand. One example of reversal from a computer system to a manual system for this reason is the Interest Register maintained by RAE Farnborough. The computer produced version of this Register has been described by Wright[32] but because of the disproportionate amount of effort needed to update the computer records and the time delay the Register is now maintained as a manual card index which can be updated instantly.

Computers used in user orientated areas may cause a few problems because they are inflexible, are totally dependent on the data they hold having been correctly input and do not possess the essential human qualities necessary to operate an effective communication between the user and the information staff. This human element should always be available to maintain this communication, interpret the computer's actions and if necessary over-ride them.

Mechanization efforts should be planned and implemented very carefully.[91] An increase in the overall costs frequently occurs because there are operating costs and conversion costs, e.g. capital investment in equipment, system design, program development and conversion of records. Any added benefit to the users should be balanced against these extra costs. Cost-effectiveness and cost-benefit determinations are very important.[80,92] When mechanization is being proposed in order to improve the capabilities or capacities of the information centre it can be difficult to justify because there are no immediate measurable advantages. Some careful long-term planning may enable the centre to make full use of available new technology and prevent it from becoming outdated in its techniques and overloaded in its work capacity.

The information manager must therefore decide whether mechanization is desirable and necessary and consider what its consequences will be. He should analyse his existing systems[26] very carefully and plan a variety of replacement systems to find which, original or replacement, is best. It is beneficial to look at the system operated in other information centres but the manager should remember that what applies in one centre will not necessarily apply in another.

7.2 Existing Systems

Mechanization does not necessarily mean installing a computer although there is increasing application of various types of microprocessors in information centres. Other forms of mechanization are machine-aided storage, conveyor systems for moving large piles of material around a building, automatic addressing machines for assisting the work of the mail room and mechanized reprographic systems.[31] Several applications of mechanization involving computers have already been described in detail in Section 5, Vol.II of this Manual. These include compilation of abstracting and indexing publications, report handling and stock control.

It is not necessary to possess one's own computer to take advantage of mechanization since providing the data needing to be processed is prepared in machine readable form in the information centre it can be processed by a computer bureau using programmes provided by the centre. The advantages and disadvantages of bureau working have also been discussed in Section 5, Vol.II. Many information centres started in this way and then subsequently acquired their own computers when it was shown that the system was effective, finance was available and they came under pressure for increased security. Schuler[93] has described the mechanization programme initiated at Mintech in the late 1960s and initially a computer bureau was used. The mechanization programme continued and the Department of Industry TRC now has a Business Computers Molecular 18 Mk. III computer of its own which is used to prepare R & D Abstracts[94] issues and indexes and controls a report handling and stock control system of documents.

The main impact of mechanization in industrial information centres has been on the professional staff involved in information retrieval. Many centres have installed VDUs which allows them to access externally-generated data bases[95] even if they have no other form of mechanization in the centre. Computerized information retrieval techniques are discussed in Section 7, Vol.III of this Manual.

7.3 User Reactions

'Technological innovation should be welcomed and fostered whenever it promises to reduce routine drudgery and to make the library more responsive to needs – whenever, in other words, it promises to increase rather than diminish the humane quality of the library'. Paul Buck.

Users favour any system which provides them with a better service than they had from a former system. Similarly staff are pleased to operate a system which improves their working conditions and allows them to provide a better service to the users than the system that they operated previously. Neither staff nor users want to feel that technology has become their master and it is essential and desired that the personal communication between staff and user is retained. The manager must therefore ensure that the mechanization programme that he implements fulfils these requirements. He must be careful that he does not install a system which although expected to carry out certain required functions cannot do so in practice because of limitations in the technology.

In general mechanized storage, handling and reprographic systems and the mechanization of the production of abstracting and indexing publications have met with the approval of both staff and users. Mechanized loans and ordering systems do not have the same widespread approval. Problems have arisen because of the inflexibility and impersonal approach of the computer. Computerized information retrieval has been a great success. Information retrieval using external bibliographic data bases has been shown to be both cost-effective and to provide additional qualitative advantages over manual searching.[21] A substantial improvement in productivity among professional staff involved in information retrieval and an improved quality of output has been reported. The latter is particularly true when data bases are searched which are designed for computer searching rather than manual searching e.g. INIS Atomindex and when multiconcept searches are undertaken.

7.4 Microprocessor Developments

The development of modern computer technology, particularly because of silicon chips, is so fast that new products are appearing every month. The gap between the storage capabilities of mini-computers and moderate main-frame machines is decreasing rapidly. In an earlier section of this Manual published in 1979 it was accepted that 'minicomputer' defines machines with core capacities up to 16k (16,000) bytes. During the first few months of 1980 a microcomputer with a core capacity up to 128k has been announced. The original minicomputers imposed limitations upon file and program sizes but this extension of core capacity in the microcomputer will allow for certain files and programs to be used which were hitherto thought impossible. Costs are also decreasing and a very simple system incorporating the latest technology can be obtained for a few thousand pounds sterling. This will allow small industrial information centres to have their own micro- and minicomputers to handle loans, periodical circulation, small personally generated data bases, etc. These machines are compact and can be adapted to many uses. They will release the information centre from its dependence on a main-frame computer.

'Word processors' which is the term used for machines involved in the printing of correspondence and internal reports by computer-based procedures are adding new software features all the time. Most include the following packages:– 'record processing with selection by criteria'; 'document assembly with manipulation of variables'; 'mathematics package with decimal tabulation' and 'document formatting with global search and replace'. Statistical procedures are already being added to certain models.

Microprocessor-based filming and retrieval systems are now able to link up with word-processors, copiers, etc. to offer low-cost large-scale information storage of records with fast retrieval and updatability. Updatable fiche systems using new types of film have recently been announced. One system can be used either off- or on-line. Highly automated and very much faster fiche duplication has been developed.

The information manager must choose with care the new equipment which will aid him to maintain and improve the services of his centre.

8. PROMOTIONAL ACTIVITIES

The existence of the centre and its services must be actively publicized and promoted.[70] Efforts should be made to get the publicity right so that the information services are used. Promotional activities can be of many types but some at least should involve personal contact between the centre and its users. Possible activities are:–

(1) Image of the information centre and quality of service provided.
(2) Publications.
(3) Advertising, questionnaires.

(4) Lectures/seminars/exhibitions.
(5) Information retrieval.
(6) Translation service.
(7) User relationships and personal contacts.

8.1 Image Projection

The image of the information centre as an efficient, friendly, well-managed establishment has been emphasized throughout this section of the Manual. The appearance of the centre and its staff and their willingness to provide services required by the user are vital in promoting the work of the information centre. The quality of service provided in a company centre will be publicized by users to their colleagues. For a national centre, associates in different organizations will discuss the service among themselves. Poor quality will result in adverse publicity. For a centre providing services relating to classified documents the willingness of the centre to provide a service should not be judged solely on whether they provide the documents which have been requested. There are instances where they cannot provide the document to a requester for security reasons. Similarly some documents may be completely unobtainable. An expansion of why a user cannot have a document he requires is much more desirable than a blank refusal.

8.2 Publications

Literature promoting the information centre and its services can take many forms. The simplest are leaflets or brochures describing briefly the background of an information centre, its role and the services which it offers to its users. Such leaflets should be distributed to potential users of a national information centre and given to new members of staff when they take up employment with a company. An example of this type of brochure is the RAE Library guide reproduced in CP117 (Ref.32) which describes all their library's services. More detailed leaflets about a particular service are useful and can be distribued to individual organizations or people interested in a specialized service. An example of this type of leaflet is the one distributed by TRC describing their 'TechAlert' scheme, with is reproduced in Figure 16.

Users should be kept up-to-date with changes in staff, their roles or services within the information centre and this can be achieved by circulating a Newsletter or Bulletin to users. It is always useful in leaflets, brochures and newsletters to reproduce photographs of the organization, its equipment and its staff. This assists users when they visit or contact the information centre as it gives them a feeling of personal involvement with the centre.

Current awareness bulletins and abstracting journals are ideal ways of promoting the stock of this information centre as well as providing a service to users requiring subject information. The former requires less preparation as abstracts are not involved. These publications and their production have been discussed in detail in Section 6, Vol.II of this Manual. They are particularly valuable for centralized information centres serving many sites and should be distributed as widely as possible to relevant personnel and organizations. For security reasons it may be necessary to publish several editions of each bulletin; different editions warranting different security classification and being distributed to different grades of users.

Specialized publications promoting the knowledge available in the literature of the information centre can be prepared. It is essential to disseminate information on technological innovations to potential users. An example is the 'TechAlert' scheme mentioned above which replaced a service known as 'Techlink'. 'Techlinks' were single-page leaflets which selectively disseminated information on technological innovations orginating in research establishments, universities and colleges throughout Britain and overseas to potential users in industry.[96] The service aimed to draw attention to work which would not otherwise be widely publicised. Each leaflet indicated where and how further information on the subject could be obtained. Information for these leaflets was obtained from TRC's own stock and from unclassified items passed to them by DRIC in their effort to promote usage of aerospace and defence innovations among the civilian community. 'TechAlert' has continued and extended this service. It produces digests of the reports and they are published regularly in leading specialist journals instead of only being available to subscribers.

In a company information centre a member of staff can scan journals and incoming trade and press literature with the same objective. Potential users could be provided with pre-digested details of the information or with a photocopy of the article concerned.

8.3 Advertising, Questionnaires

The existence of a national information centre and its services can be advertised in relevant technical and information science periodicals and publications. Similarly a company information centre can be advertised in a company publication to alert potential users to its existence. An article describing the work and personnel of the centre is beneficial. Some of the leaflets described above could be displayed prominently on company noticeboards in areas of general use and in the information centre itself. They should be eye-catching and easily read but designed to make the maximum impact.

Paper questionnaires about the type of service required and its usage are not to be recommended. Firstly, they do not necessarily reach the person who should be filling them in. Secondly, most people receiving them ignore them or resentfully complete them. The only circumstance under which they can be truly said to be effective is if the information

Department of Industry

Technology Reports Centre

Orpington Kent
BR5 3RF

Telephone: Orpington (STD 0689) 32111
Telex: 896866 [redacted] MOD PE G

TechAlert

TechAlert, a scheme from the Technology Reports Centre, aims to promote prosperity through technological advance in industry, it expands and replaces the Techlink service which was only available to subscribers.

The Technology Reports Centre gets over 50 000 reports each year. They cover work in government research establishments and well known universities, institutes of technology and company R & D establishments here and overseas.

These unpublished reports contain a wealth of information of great potential value to industry: ideas for better products, new techniques, safer and more efficient methods, new solutions to old problems, and general technological information not readily available elsewhere.

This information is the end product of a huge financial investment and it is available to help your company.

The problem is to spot the significant report. No company can afford to amass and sort through the mountain of available reports. TRC can. TRC can because it does it for a host of users as a documentation centre. Its speciality is processing scientific and technological information. Experts at TRC single out reports which offer opportunities for commercial exploitation or which will help keep industry abreast of the most recent developments.

TechAlert brings these special reports to the attention of those who can profit from the information they contain. It produces digests of the reports to give those who can exploit their contents the opportunity to put themselves and their companies ahead of their competitors.

These digests are now being published regularly in some of this country's leading specialist journals. Industrial sectors covered include: electronics, mechanical and electrical engineering, composite materials, tribology, nondestructive testing and building. Turn over page for some specimen articles.

Through TechAlert, journal readers can:

- buy a cost-price copy of any report they need
- get a short selected bibliography of related reports free
- be put in touch with experts for further information.

Contact: E H DAVIS Orpington 32111 ext 19.

Fig.16 Leaflet distributed by the Technical Reports Centre (TRC) describing their TechAlert scheme

manager already has a very good relationship with his users. If he wishes to assess his service with a view to changes occurring, a questionnaire could be circulated to known users requesting their assistance. Replies to this could then be followed by personal communication.

8.4 Lectures, Seminars, Exhibitions

Conferences and exhibitions are good media for promoting information services. The staff of a national information centre should be prepared to attend such events as frequently as possible and use them to meet potential users and discuss freely with them the services that the centre can provide. At many such events organized by learned societies in the field of information work or by manufacturers, stalls are provided for the display of publications and posters and for the demonstration of services, e.g. on-line retrieval. Lectures given at conferences should be designed to generate interest in the centre and should allow time for questions at the end.

In a company, lectures should be given to new staff during induction courses and a tour of the information centre should be arranged. This enables potential users to meet the information staff and be aware of the literature and services available. Such visits should not be restricted to potential users but should also include staff, such as secretaries, who may have to visit the information centre on behalf of their supervisors.

8.5 Information Retrieval

The provision of a general or personalised information retrieval service is an excellent method of promoting an information centre and its resources. Different methods of performing such a service have been described in Section 7, Vol.III of this Manual. They include specific retrospective searches and personalised profiles carried out on a regular basis. Information staff should not wait for users to contact them to do such searches but should take the opportunity of visiting users to describe the service, do a trial search and advise on future requirements. Actual production of information about a subject is much more impressive than merely describing what can be achieved. It is likely that a national information centre will charge for its retrieval service. The service can be initially promoted by providing a free or reduced-price search to demonstrate its capabilities. In a company, information staff (through their contact with research and technical staff) should be able to build up search profiles which will provide plenty of relevant information on a topic. This can be done on a regular basis for the duration of a particular project.

8.6 Translation Service

Useful information is frequently published in a language which the user cannot read.[97] Such articles may not have been translated by any other organization. Consequently the provision of a translation service is a valuable role of an information centre. This does not necessarily mean that members of the information staff themselves have to do the translations but that they can arrange for the production of a translation. Certain information units do employ their own translator/s whereas others liaise with translation agencies.

8.7 Personal Contacts

Personal relationships between users and the staff of an information centre are undoubtedly the best way of promoting the services of the centre. No amount of printed literature has the same impact on a user as personal contact with a member of staff. Every effort should be made therefore to arrange for the information staff to go out and meet the user both in his place of work and socially. This is undoubtedly easier in a company where users and the information unit are located on the same site and have many possible points of contact. It can however be achieved by national information centres too. Where frequent personal contact is not possible, national information centres can operate a personal telephone advisory service. An example of this is the Technology Advisory Point (TAP) which has been established by the Technology Reports Centre and provides a free elementary advice service.

9. FUTURE DEVELOPMENTS

- No information centre can be committed to permanent functions because of the changing requirements for information. A national centre should be prepared to fill gaps in the services provided by other organizations and to set up new services. If it finds that it is duplicating the services of other organizations then such duplication should be eliminated. It will probably have to charge for its services and if finance becomes a problem then it will have to sell more of its services to maintain its funds. A company information centre should also be prepared to provide new services when required.

- There is increasing recognition that information management is an activity that extends beyond the walls of the traditional library/information unit and is concerned with the organization and optimization of the total information resources within an organization. This will undoubtedly mean that information units will increasingly become more involved with information outside the usual research and technical literature. An example is the fast growth in the utilisation of business Viewdata information retrieval terminals.

The British Post Office PRESTEL System which was launched as a service in September 1979 is now available within local calling distance to more than 50% of all UK telephone subscribers. PRESTEL users can already access some

150,000 pages of business, time-tables and other information and the trend will be to provide access to a wider spectrum of specialist data banks. The television networks in the UK also offer Viewdata services. The library/information centre should consider whether a Viewdata terminal should be provided to take advantage of these services for its customers.[98]

- Another possible development could be a requirement for the centre to enlarge its role to include information analysis.[99] This will require the information staff to assess and analyze the value of the incoming literature in specific technical fields and produce condensed data, summaries or state-of-the-art reviews. The staff involved would need to be subject specialists; some excellent guidelines on the work of Information Analysis Centres are given in the American 'Directory of federally supported information analysis centres'.[100]

- It has been suggested that communication satellites will have as large and permanent impact on information centres in the 1980s as computers have had in the 1960s and 1970s (Ref.101). The provision of library services via satellite have been considered and it has been suggested that satellite transmission is an economical alternative for future planning. This could include inter-library loans, document delivery and information retrieval. The European Space Agency (ESA) has discussed the possibility of using its Orbital Test Satellite (OTS), which was successfully launched in 1978, for on-line information retrieval in the 1980s (Ref.102). Accessing ESA's RECON data base via satellite has been demonstrated and electronic document delivery is being studied. The advent of low-cost, distance-insensitive, wideband analog or digital networks which are reviewed in Section 12 of this Manual will have a substantial effect on the future operations and services of information centres.

ACKNOWLEDGEMENT

I should like to thank the following librarians and information managers: Mr F.A.Graham (UKAEA); Dr B.G.Dutton (Imperial Chemical Industries Ltd); Mrs J.Adams (Nuffield Radio Astronomy Laboratories); Mr T.C.Norton (RAE); Mr Lowe (BAe); Mr Crawford (Ferranti Ltd) and Mr M.Hammond (TRC) and their staffs for their assistance and helpful advice. Particular thanks are due to Mr A.Bruce (DRIC) and his staff, especially Mr J.Dunne, for their support, valuable advice and provision of documents. I should also like to thank Mr K.Farmery (John Rylands University Library of Manchester) and Mr J.Dunne for their assistance in the editing of this text and Mrs P.Simpson for her efforts in preparing it for publication. Finally I greatly appreciate the cooperation of Mr D.Mason (College of Librarianship Wales) and his publishers, Peter Peregrinus, in allowing me to use material from his book.

REFERENCES

1. Line, M.B. — *The Practical Impact of UAP: UAP and the UK*. Unesco J of Inf. Science, Librarianship and Archive Administration, 1, pp.76–78, 99–101, 1979.

2. Gray, J. — *National Policies for Scientific and Technical Information1. The United Kingdom*. J. Information Science, 1, pp.43–47, 1979.

3. Hart, G.W. — *The Use of a Mini-computer at the Defence Research Information Centre (DRIC)*. AGARD Conference Proceedings CP-207, pp.2.1–2.13, 1976.

4. Douville, J.A. — *Technical Information Centres: Specialized Services to Science and Technology. An Overview*. J. American Society for Information Science, 23, pp.176–184, 1972.

5. Dunne, J. — *Report Processing and User Services at the Defence Research Information Centre*. State Librarian, pp.17–20, July 1978.

6. Lowndes, S. Sharp, I. — *The Need for Versatility in a Small Research Library Environment*. Aslib Proceedings, 27, pp.90–97, 1975.

7. Bethell, J.P. — *Establishing Small Information Centres in Industry*. AGARD Conference Proceedings CP-117, pp.1.1–1.7, 1973.

8. Wood, D.N. — *User Studies: A Review of the Literature from 1966–1970*. Aslib Proceedings, 23, pp.11 ff., 1971.

9. Burkett, J. — *Industrial and Related Library and Information Services in the United Kingdom (3rd edition)*. Library Association, London, 1972.

10. Wilson-Davis, K. — *The Centre for Research on User Studies: Aims and Functions*. Aslib Proceedings, 29, pp.67–76, 1977.

11. Blom, A. — *Development of a Method for Determining the Information Needs of a Group of Research Scientists*. CRUS News, No.7, pp.7–8, 1979.

12. Slater, M. Fisher, P. — *Use Made of Technical Libraries*. Aslib, London, 1968. Occasional Publications No.2.

13. Line, M.B. — *Library Surveys: An Introduction to Their Use, Planning, Procedure and Presentation*. Clive Bingley, London, 1967.

14. Disch, A. — *The Voice of the User: His Information Needs and Requirements*. AGARD Conference Proceedings CP-179, pp.14.1–14.7, 1975.

15. IFLA Office for International Lending — *Brief Guide to National Centres of International Lending and Photocopying*. British Library Lending Division, Boston Spa, 1976.

16. Vanwijngaerden, F. — *Handbook on the International Exchange of Publications (4th edition)*. UNESCO, Paris, 1978.

17. Davey, A.B. MacLachlan, J. — *The Research Associations – Their Contribution to the Nation's Information Store*. Aslib Proceedings, 30, pp.55–63, 1978.

18. Adler, L.S. — *Trade Associations and the Services they Provide*. Aslib Proceedings, 27, pp.440–446, 1975.

19. Teague, S.J. — *Microform Librarianship (2nd edition)*. Butterworths, London, 1979.

20. Starker, L.N. — *User Experiences with Primary Journals on 16 mm Film*. J. Chemical Documentation, 10, pp.5–6, 1970.

21. Flynn, T. et al. — *Cost Effectiveness Comparison of Online and Manual Bibliographic Information Retrieval*. J. Information Science, 1, pp.77–84, 1979.

22. Tylicki, E. — *Preparation of a Microfilm File of Company Technical Reports*. J. Chemical Documentation, 10, pp.20–22, 1970.

23. Powell, D.J. — *The Law of Copyright in Relation to Publications on Microfilm*. Microdoc, 13, pp.34–37, 1974.

24. Tallman, J.E. — *One Year's Experience with CONTU Guidelines for Interlibrary Loan Photocopies*. J. Academic Librarianship, 5, pp.71–74, 1979.

25. Lundberg, I. — *Photocopying at Scientific Libraries and the Copyright Legislation: Present Situation and Future Perspectives*. Copyright Bulletin, 13, pp.23–26, 1979.

26. Mason, D. — *Information Management*. Peter Peregrinus, Stevenage, 1978.

27. Allen, T.J. — *The Importance of Direct Personal Communication in the Transfer of Technology*. AGARD Conference Proceedings CP-179, pp.2.1–2.10, 1975.

28. Allen, T.J. — *Roles in Technical Communication Networks*. In: Nelson, C.E. and Pollock, D.K. eds. *Communication Among Scientists and Engineers*. pp.191–208, Lexington Heath, 1970.

29. Frost, P.A. Whitley, R. — *Communication Patterns in a Research Laboratory*. R & D Management, 1, pp.71–79, 1971.

30. Wootton, C.B. — *The Growth of the Literature and its Implications for Library Storage*. 2. Serials. BLL Review, 4, pp.41–43, 1976.

31. Holloway, A.H. Ridler, E.H. Yates, B. — *Information Work with Unpublished Reports*. André Deutsch, London, 1976. (Institute of Information Scientists. Monograph Series.)

32. Wright, R.C. — *Library and Information Services at the Royal Aircraft Establishment: Some Problems and Their Present Solution*. AGARD Conference Proceedings CP-117, pp.2.1–2.17, 1972.

33. Newman, W.B. Amir, M.J. — *Report Literature: Selecting versus Collecting*. Special Libraries, 69, pp.415–424, 1978.

34. White, H.S. — *Cost-effectiveness and Cost-benefit Determinations in Special Libraries*. Special Libraries, 70, pp.163–169, 1979.

35. Clements, D.W.G. — *The Costing of Library Systems*. Aslib Proceedings, 27, pp.98–111, 1975.

36. Ford, G. — *Library Automation: Guidelines to Costing*. Lancaster University, UK, March 1973. (Report prepared for OSTI.) OSTI Report No.5153.

37. Mason, D. — *P.P.B.S. – Application to an Industrial Information and Library Service*. J. Librarianship, 4, pp.91 ff., 1972.

38. Evans, G.E. — *Management Techniques for Librarians*. Academic, London, 1976.

39. Department of Industry — *Technical Services for Industry*. Department of Industry, London, 1977.

40. Wasserman, P. Daniel, E. — *Library and Information Centre Management*. In: *Annual Review of Information Science and Technology. Vol.4*. Candra, C.A. and Luke, A.W. eds pp.405–438, Encyclopedia Britannica, Chicago, 1969.

41. Yates, B. — *The Place of the Information Service within the Organizational Structure*. Aslib Proceedings, 25, pp.430–443, 1973.

42. British Standards Institution — *Code of Basic Data for the Design of Buildings. Chapter V – Loading. Pt 1. Dead and Imposed Loads. Metric Units*. CP3, Chapter V, pt 1, 1967.

43. Metcalf, K.D. — *Planning Academic and Research Library Buildings*. McGraw-Hill, New York, 1966.

44. Lewis, C.M. — *Special Libraries: How to Plan and Equip Them*. Special Libraries Association, New York, 1963. (SLA Monograph No.2.)

45. Anthony, L.J. — *Planning Library and Information Services*. In: Batten, W.E. ed. *Handbook of Special Librarianship and Information Work (4th edition)*. pp.8–71, Aslib, London, 1975. (5th edition due for publication in 1981.)

46. Marples, D.L. Knell, K.A. — *Circulation and Library Design: the Influence of Movement on the Layout of Libraries*. Cambridge Univeristy Engineering Dept, 1971.

47. Mount, E. — *Planning the Special Library*. Special Libraries Association, New York, 1972.

48. Reed, J.B. — *Library Planning*. In: Ashworth, W. ed. *Handbook of Special Librarianship and Information Work (2nd edition)*. pp.237. Aslib, London, 1962.

49. Department of the Environment: Directorate of Building Development — *The Planned Open Office: a Primer for Management*. HMSO, London, 1971.

50. Pilkington Research Unit — *Office Design: a Study of Environment*. Liverpool University Dept of Building Science, May 1965.

51 Fairweather, L. Sliwa, J.A. — *A.J. Metric Handbook (3rd edition)*. Architectural Press, London, 1970.

52. Baker, G.G. et al. — *A Guide to Computer Output Microfilm (5th edition)*. Baker Associates, Guildford, 1979.

53. Vessey, H.F. — *The Use of Microfiche for Scientific and Technical Reports*. AGARD Advisory Report No.27, 1970.

54. Williams, B.J.S. Broadhurst, R.N. — *The Use of Microfiches for Scientific and Technical Reports – Considerations for the Small User*. AGARDograph No.198, 1974.

55. British Standards Institution — *Recommendations for the Storage of Microfilm*. BS 1153, 1955.

56. Cakir, A. Hart, D.J. Stewart, T.F.M. — *Visual Display Terminals: a Manual Covering Erognomics, Workplace Design, Health and Safety, Task Organization*. Wiley, Chichester, 1980.

57. Stradling, R. *Aslib, Report of Proceedings*. 21st Conference, p.27, 1946.

58. Oldaker, L.T. *Administration Problems of a Special Library. A. The Service and its Staff*. Aslib Proceedings, 5, pp.307–308, 1953.

59. Hanson, C.W. Slater, M. *Does your Firm Need its Own Information Service*? OECD, 1962.

60. Mason, D. *Problems of Getting – and Keeping – Staff*. Aslib Proceedings, 18, pp.6–15, 1966.

61. Dutton, B.G. *Staff Management and Staff Participation*. Aslib Proceedings, 25, pp.111–125, 1973.

62. Robinson, F. *Getting into Management*. Information Scientist, 8, pp.107–115, 1974.

63. Harrison, C.T. *Communication in Library Management*. Association of Assistant Librarians (UK), London, 1979.

64. Magson, M.S. *Management*. In: Batten, W.E. *Handbook of Special Librarianship and Information Work (4th edition)*. pp.388–408, Aslib, London, 1975.

65. Creth, S. *Conducting an Effective Employment Interview*. J. Academic Librarianship, 4, pp.356–360, 1978.

66. Hilton, R.C. *Performance Evaluation of Library Personnel*. Special Libraries, 69, pp.429–434, 1978.

67. Dutton, B.G. *Job Assessment and Job Evaluation*. Aslib Proceedings, 28, pp.144–160, 1976.

68. Kashyap, M.M. *Decision-making for Library Managers and Systems Analysts: a Systematic Approach*. J. of Library and Information Science (Delhi), 3, pp.139–155, 1978.

69. Burkett, J. *Library and Information Networks in the UK*. Aslib, London, 1980.

70. Haygarth-Jackson, A.R. *Publicity or Selling the Information Service*. Aslib Proceedings, 25, pp.385–388, 1973.

71. Rea, J.C. *Development of Criteria and Procedures for Management of Classified Document Collections*. 1969, AD687482.

72. Arnold, D.V. *An Industrial Information Service: the Effects of Growth on its Organization and Administration*. Aslib Proceedings, 16, pp.234–245, 1964.

73. Myers, M.S. *The Mid-career Special Librarian: Where do we Go from Here*? Special Libraries, 70, pp.263–271, 1979.

74. Dalton, M.S. *The Role of Subject Specialism in the Future Development of Information Services*. J. Information Science, 1, pp.107–112, 1979.

75. Mack, E. *In-training in Information and Special Library Units*. Aslib, London, 1973.

76. Special Libraries Association *SLA 1978 Salary Survey Update*. Special Libraries, 69, pp.501–502, 1978.

77. Goldstein, M.Z. Sweeney, C.M. *Aptitude Requirements for Library Assistants in Special Libraries*. Special Libraries, 70, pp.373–376, 1979.

78. Magson, M.S. *Techniques for Measurement of Cost-benefit in Information Centres*. Aslib Proceedings, 15, pp.164–185, 1973.

79. Jones, A.C. *Presenting a Development Plan for Approval*. AGARD Conference Proceedings CP-117, pp.7.1–7.5, 1973.

80. Warheit, I.A. *The Automation of Libraries. Some Economic Considerations*. Special Libraries, 63, pp.1–7, 1972.

81. Allardyce, A. Rovelstad, H. *Duplicate and Surplus Exchange*. Interlending Review, 7, pp.90–101, 1979.

82. Auger, C.P. *Use of Reports Literature*. Butterworths, London, 1975.

83. Brand, R. — *Dokumentation von Firmenschriften*. Nachrichten für Dokumentation, 24, pp.73–80, 1973.

84. Ford, M. — *The Technical Indexes system for the Control of Trade Literature*. Aslib Proceedings, 24, pp.284–292, 1972.

85. – — AGARD Lecture Series No.69. *How to Obtain Information in Different Fields of Science and Technology – A User's Guide*, 1974.

86. Walkins, P.S. — *Filing and Storage of Reports*. Aslib Proceedings, 5, pp.335–340, 1953.

87. Line, M.B. — *The Role of National Libraries: a Reassessment*. Libri, 30, pp.1–16, 1980.

88. Kirsch, K C. Rubinstein, A.H. — *Converting from Hard Copy to Microfilm: an Administrative Experiment*. Collection Management, 2, pp.279–302, 1978.

89. Zamora, G.J. Adamson, M.C. — *Looking Back at the Microfilm Decision: Expectations and Experiences*. Special Libraries, 70, pp.179–181, 1979.

90. Vickers, P.H. — *Tape-typewriters: Practical Aspects of their Use in Information Work*. Information Scientist, 1, pp.17–32, 1967.

91. Francklin, T.W. Willets, M. — *Experiences in Computerizing BNF's Information System*. Information Scientist, 10, pp.43–55, 1976.

92. Vikers, P.H. — *A Cost Survey of Mechanized Information Systems*. J. of Documentation, 29, pp.258–280, 1973.

93. Schuler, S.C. — *Mintech Reports Centre Services and Mechanization Programme*. Information Scientist, 4, pp.47–64, 1970.

94. Hart, G.W. — *Production of an Abstracts Journal*. AGARD Lecture Series LS-69, pp.5.1–5.17, 1977.

95. Friend, P.D. — *The Use of External Data Bases to Extend Awareness Services Based on Internal Resources at AWRE, Aldermaston*. Aslib Proceedings, 24, pp.678-685, 1972.

96. Schuler, S.C. — *Tailored Abstracts and Technical Digests. A Service of Industry*. AGARD Conference Proceedings CP117, pp.8.1–8.9, 1972.

97. Ellen, S.R. — *Survey of Foreign Language Problems Facing the Research Worker*. Interlending Review, 7, pp.31–41, 1979.

98. – — *Online 'Videotex, Viewdata and Teletext' the Transcript from Viewdata '80*. Online Publications Ltd, Oxford, 1980.

99. Bordiss, P.J. — *Presenting Search Results to Meet Specific User Needs*. Aslib Proceedings, 26, pp.468–472, 1974.

100. – — *Directory of Federally Supported Information Analysis Centres*. Compiled by the National Referral Centre, Library of Congress, USA, 1974, PB-233582, (update of PB-189300).

101. Liu, R. — *Telelibrary: Library Services via Satellite*. Special Libraries, 70, pp.363–372, 1979.

102. Hanell, S. — *Prospects for Specialized Satellite Communication Services in Europe in the 1980s*. The Online Age: Proceedings of the EUSIDIC Conference, Oslo, 1975, pp.34–48.

BIBLIOGRAPHY

1. Boss, R.W. — *The Library Manager's Guide to Automation*. Knowledge Industry Publications, 1979.
2. Chen, C.C. — *Quantitative Measurement and Dynamic Library Service*. Oryx Press, Phoenix, 1978.
3. Garvey, W.D. — *Communication*. Pergamon, Oxford, 1979.
4. Hamburg, M. et al. — *Library Planning and Decision-making Systems*. MIT Press, Cambridge, Mass., 1974.
5. Jackson, E.B. Jackson, R.L. — *Industrial Information Systems*. Dowden, Hutchinson and Ross, 1978.
6. Kent, A. — *Library Planning for Automation*. Macmillan, London, 1965.
7. Murrell, H. — *Motivation at Work*. Methuen, London, 1976.
8. Rizzo, J.R. — *Management for Librarians; Fundamentals and Issues*. Aldwych Press, London, 1980.
9. Schwarz, S. et al. — *Library Services in Transition*. Royal Institute of Technical Literature, Stockholm, 1978.
10. Strauss, L.J. et al. — *Scientific and Technical Libraries, their Organization and Administration (2nd edition)*. Becker and Hayes, 1972.
11. Swihart, S.J. Hefley, B.F. — *Computer Systems in the Library: a Handbook for Managers and Designers*. Melville Publishing Co., Los Angeles, 1973.
12. Taylor, L.J. — *Copyright for Librarians*. Tamarisk Books, Hastings, 1980.

Section 12

NETWORKS AND EXTERNAL SOURCES OF INFORMATION

by
Philip F.Eckert
Hal G.Wynne
NASA Scientific and Technical
Information Facility
Operated by
PRC Data Services Company
Baltimore/Washington
International Airport
Maryland, USA

and

W.A.Martin
Angelo Bodini
Information Retrieval Service
European Space Agency
Frascati (Rome), Italy

ABSTRACT

In this section the basic functional aspects of telecommunications, text searching and networking are reviewed. A description is given of some of the various information networks, both commercial and non-commercial, which are operational in the United States and Europe. A review is made of selected external online bibliographic data bases and factual data banks on specific topics that are currently available together with details of services offered and contact points.

CONTENTS

		Page
1.	INTRODUCTION	95
2.	DOCUMENT PROCESSING FOR RETRIEVAL	95
3.	TELECOMMUNICATIONS FOR SEARCHING EXTERNAL DATA BASES	96
	3.1 Interactive and Bulk Traffic	96
	3.2 Selected Definitions	96
	3.3 Telecommunications Switching	97
	3.4 Packet Switching	97
	3.5 ARPANET	98
	3.6 Commercially Available Packet Networks – Examples	98
	3.6.1 TELENET	98
	3.6.2 TYMNET	99
	3.6.3 EURONET	100
4.	SELECTED EXTERNAL DATA BASES IN THE USA	102
	4.1 NASA/RECON System	103
	4.1.1 NASA/RECON Languages	103
	4.1.2 NASA/RECON Logical Operators	104
	4.1.3 Index Terms	104
	4.1.4 NASA Thesaurus	104
	4.1.5 Text Search	104
	4.1.6 Availability of NASA/RECON	104
	4.2 DOE/RECON System	105
	4.2.1 DOE/RECON Command Language	105
	4.2.2 DOE/RECON Logical Operators	105
	4.2.3 Availability	105
	4.2.4 Energy Data Base (EDB)	105
	4.3 Defence RDT&E On-Line System	105
	4.3.1 Defense RDT&E On-Line System Language	106
	4.3.2 Defense RTD&E On-Line System Logical Operators	106
	4.3.3 RDT&E On-Line Systems, Text and Title Searching	106
	4.3.4 Printing Search Results	106
	4.4 Lockheed Information System – DIALOG	106
	4.4.1 DIALOG Command Language	107
	4.4.2 DIALOG Logical Operators	107
	4.4.3 DIALOG Retrieval Methods	107
	4.4.4 Formats for DIALOG Search Results	107
	4.4.5 Display and Printing Search Results	107
	4.5 System Development Corp. – SDC ORBIT	108
	4.5.1 Searching on ORBIT	108
	4.5.2 Tutorial Assistance on ORBIT	108
	4.5.3 Understanding the Boolean Operators	109
	4.5.4 ORBIT Quick-Reference Guide	109
	4.5.5 Availability of ORBIT	109
	4.6 The Bibliographic Retrieval System – BRS Data Bases	109
	4.6.1 BRS Logical Operators	109
	4.6.2 The BRS Loading Program	110
	4.6.3 Availability	110
5.	SELECTED EXTERNAL DATA BASES IN EUROPE	110
	5.1 ESA/IRS – The European Space Agency's Information Retrieval Service	111
	5.2 International Atomic Energy Agency (IAEA)	113
	5.3 TELESYSTEMES (France)	114
	5.4 SPIDEL (Service pour l'Information et la Documentation En Ligne) (France)	114
	5.5 INKA Fachinformationszentrum 4 (Fachinformationszentrum Energie, Physik, Mathematik GmbH, Karlsruhe)	115
	5.6 DIMDI (Deutsches Institut für Medizinische Dokumentation und Information, Köln)	115
	5.7 DATA-STAR (Switzerland)	116
	5.8 BLAISE (British Library Automated Information Service)	116
	5.9 PERGAMON-INFOLINE (United Kingdom)	117
6.	FUTURE DEVELOPMENTS	117
7.	ACKNOWLEDGEMENTS	118
	REFERENCES	118

1. INTRODUCTION

The purpose of this section of the manual is to brief operators or potential operators of new technical information centres on the fundamental aspects of telecommunications, networking, and the use and capability of established online data bases -- both commercial and noncommercial.

This section of the manual is unique in that one part of it has been prepared by personnel at the European Space Agency at Frascati, Italy and the other part by personnel at the NASA Scientific and Technical Information Facility at the Baltimore/Washington International Airport, Maryland. Perhaps a more interesting aspect of the preparation of this section is that coordination was effected through the general editor in the United Kingdom and that the European and American co-authors have never met one another.

One of the American authors of this section, in a paper[1] entitled "Document Retrieval and Dissemination Systems" that was published in 1972, stated, "Prospects for the 1970s are exciting, for during the next decade computerized document retrieval systems will probably become a routine feature of our everyday professional lives. Batch systems will continue for mass input and mass output tasks and interactive systems will supplement (not supplant) them. Text processing techniques will continue to advance . . . ." How true the prediction was! During the seventies we all witnessed the flourishing of the interactive information retrieval technology beyond our wildest dreams of a decade earlier. What made it possible? A simple answer would be the growing diversity of telecommunications services or teleprocessing, minicomputers, and text searching. In this section your ESA (European Space Agency) and NASA (National Aeronautics and Space Administration) co-authors will touch on the basics of telecommunications and text searching, and describe and provide selected references to external sources or data bases in both Europe and the United States.

2. DOCUMENT PROCESSING FOR RETRIEVAL

A document surrogate usually represents a document for index processing and retrieval processing. A document surrogate is a condensed record to represent a document in printed form, in microform, or in a machine-readable medium containing bibliographic data for a citation and abstract or contents note. Prior to text indexing (machine indexing of the title, abstract, or other elements as desired), classical or standard indexes of a document collection were devised, manually, by author, corporate author, report number, contract number, and by subject term (subject content). With the advent of text processing, the standard index terms were augmented by key, individual words in the titles and abstracts. For example, the following document surrogate would have been retrieved in a search for the number 316 in either the title or the abstract. Text retrieval has revolutionized the searching process and made possible the proliferation of searchable bases that will be described later.

```
                PRINT 01/2/1-2          TERMINAL=67
        80A39745   ISSUE 16   PAGE 2935   CATEGORY 26   CNT#:
        E(40-1)-5076   79/09/00   10 PAGES   UNCLASSIFIED
        DOCUMENT
UTTL:   High temperature sulfidation of six alloys
AUTH:   A/HSU, C. H.;  B/GILLIS, P. P.;  C/DE ANGELIS, R. J.
        PAA: C/(Kentucky, University, Lexington, Ky.)
        Journal of Materials for Energy Systems, vol.1, Sept.
        1979, p. 15-24.
MAJS:   /*FERROUS METALS/*HIGH TEMPERATURE/*HYDROGEN SULFIDE/*
        METAL SURFACES/*SULFATION/*SURFACE REACTIONS
MINS:   / CHEMICAL COMPOSITION/ COAL GASIFICATION/ CORROSION
        RESISTANCE/ ELECTRON MICROSCOPY/ ENERGY TECHNOLOGY/
        GAS MIXTURES/ METALLOGRAPHY/ PHYSICAL PROPERTIES/
        STAINLESS STEELS/ X RAY ANALYSIS
ABA:    (Author)
ABS:    Six ferrous alloys were exposed for 100 h to a gas
        mixture containing 1% hydrogen sulfide and 3% steam at
        a temperature of 650 C.  Their relative resistances to
        corrosive attack were in the order:  plain carbon
        (worst), Inconel 600, Incoloy 800, 316 stainless, 304
        stainless and Armco 18SR (best).
```

Similarly, the following document surrogate was retrieved on the phrase "packet switching" from either the abstract or the title.

79A13447 ISSUE 3 PAGE 364 CATEGORY 32 77/00/00
4 PAGES UNCLASSIFIED DOCUMENT
UTTL: Impact of military requirements on packet switching network design
AUTH: A/SHAH, A. N. PAA: A/(Computer Sciences Corp., Falls Church, Va.)
In: National Electronics Conference, Chicago, Ill., October 10-12, 1977, Proceedings. Volume 31. (A79-13441 03-32) Oak Brook, Ill., National Engineering Consortium, Inc., 1977, p. 218-221.
MAJS: /*COMMUNICATION NETWORKS/*COMPUTER NETWORKS/*COMPUTER SYSTEMS DESIGN/*DATA PROCESSING/*MILITARY TECHNOLOGY/*NETWORK SYNTHESIS/*SWITCHING
MINS: / COMPUTER INFORMATION SECURITY/ DATA TRANSMISSION
ABA: B.J.
ABS: The paper examines the impact of military requirements such as data security and precedence on the design of a packet switching network for the interconnection of computer systems. The impact is not assessed in light of the Autodin II military network, since detailed information for the network is not available. Instead, the impact is assessed by comparing the security and precedence requirements against those of Arpanet, the nonmilitary packet switching network. Emphasis is placed on network protocols, the functions performed by a switching node, and system overhead.

In some systems, a certain field must be specified for a search term, whereas in other systems the search term, under a certain protocol, can be applied to all searchable fields. But more about his later.

3. TELECOMMUNICATIONS FOR SEARCHING EXTERNAL DATA BASES

3.1 Interactive and Bulk Traffic

The modes of network use provide the fundamental requirements that a network architecture must satisfy. There are two basic categories of traffic carried by data networks today, "interactive" and "bulk". Interactive traffic may be generated by terminal users interacting with an online information retrieval system, for example airline reservations, or general purpose time sharing applications. This mode of network use requires low transmission delays but only modest network bandwidth, or individual line capacity.

Bulk transmission, as would be appropriate for transmission of files between computers, or for delivery of an adequate amount of primary documents, requires, on the other hand, high bandwidth without a stringent delay requirement. Our attention will be concentrated mainly on the first category of traffic.

The problem of searching a data base at point A from point B where the distance AB could be several thousand miles is solved through the interfacing of the data-base at A with the retrieval unit at B through the means of telecommunications (communications at a distance, as by telephone, telegraph, cable, or radio). At point A the data base is in residence in a computer system awaiting to be interrogated locally or remotely. For remote interrogation a direct telephone circuit or circuit with many paths will be used by a dial-in terminal that is coupled to the circuit by a modem.

3.2 Selected Definitions[2,3,4]

Dial-In Terminal – A device capable of sending and/or receiving information over switched communications channels, normally associated with the standard dial telephone network.

Dedicated Line – A transmission line fixed between two points that is used exclusively for a single purpose or by a single subscriber.

Modem – Contraction of modulation-demodulation. A device that modulates and demodulates signals transmitted over communications facilities; permits use of analog communications facilities for the transmission of digital information; the modulator is for transmission and the demodulator for reception.

Duplex Transmission – Simultaneous two-way independent transmission in both directions. Also called full-duplex transmission.

Half Duplex – A circuit designed for transmission in either direction but not in both directions simultaneously.

Message Switching – The technique of receiving a message, storing it until the proper outgoing line is available, and then retransmitting it. No direct connection between the incoming and outgoing lines is required as in line switching.

Line Switching – Switching in which a circuit path is set up between the incoming and outgoing lines. Contrasted with message switching, in which no such physical path is established. Also called circuit switching.

Bit – Contraction of binary digit, the smallest unit of information in a binary system. A bit represents the choice between 1 (one) and 0 (zero).

Baud – Unit of signaling speed. The speed in bauds is the number of discrete conditions or signal events per second. If each signal event represents only one bit condition, baud is the same as bits per second. If a signal event represents other than one bit, e.g., dibit, baud does not equal bits per second.

Dibit – A group of two bits. In four-phase modulation, each possible dibit is encoded as one of four unique carrier phase shifts. The four possible states for a dibit are 00, 01, 10, 11.

Modulator – A device that converts a signal (voice or other) into a form that can be transmitted.

Network – A series of points connected by communication channels. The switched telephone network is a network of telephone lines normally used for telephone calls. Also defined as integrated communications facilities in providing packet-switched data communications service.

Node – In a topological description of a network a node is a point of junction of the links; also a switching centre, particularly in the context of packet switching.

Polling – A means of controlling communications lines. Polling is used to ensure an orderly flow of data to a central location. Polling goes like this: "Terminal A. Have you anything to send?" If not, "Terminal B. Have you anything to send?" And so on. Polling makes certain that no terminal is kept waiting for a long time.

CCITT X.25 Interface or Protocol – Proposed standard or interface designed to guide a packet to its destination in a packet-switched network and to transfer data across networks and national boundaries. (CCITT is an abbreviation for the Consultative Committee on International Telegraphy and Telephony, based in Geneva.)

Data Terminal Equipment (DTE) – For a data network it is the equipment that is attached to the network to send or receive data, or both.

3.3 Telecommunications Switching

In communicating between two points, the subscriber has an option to use switched or leased lines. In the ordinary telephone call between two people, switched lines are used for voice data transmission. Of course, a private or leased line could be used, but this would be expensive. Telephone line switching was designed for connecting people to people; it is slow, taking about 10 to 30 seconds to complete a call. New networks that have high-speed switching have been developed for data transmission.

Networks that are electronically switched are called fast-connect networks. These networks are much less expensive to use than ordinary telephone circuits for retrieval of information over great distances.

The minimum billing interval on a telephone switched network is one minute; the minimum billing interval for the packet-switched networks that are described below is one second.

3.4 Packet Switching[4,5,6,11,12]

A packet is a block of data processed by a network in a defined format including header data, which controls the network's handling of the packet. A maximum size for a packet can be prescribed, and messages longer than that size have to be carried as several packets. Packet switching is defined as the transmission of data by means of addressed packets whereby a transmission channel is occupied for the duration of transmission of the packet only. The channel is then available for use by packets being transferred between different data terminal equipments (DTEs).

Packet switching in a computer network was first developed on a large scale for the ARPANET experimental data communications network in the late sixties and early seventies. Packet switching is a form of message switching in which the messages are sliced into smaller pieces called packets, which make their way through the net in a store-and-forward fashion. At the final destination, the packets are arranged in proper sequence to yield the message. The major advantage of the packet-switching technology is that the packet-switching network may be expected to deliver its packet in a fraction of a second, whereas a message-switching system routinely delivers its message in a fraction of an hour. The sharing of transmission and switching facilities by many users permits access to a very powerful network at a very low cost per message.

A typical packet has a maximum length of 1024 bits. The first two 8-bit characters and the last five 8-bit characters are hardware generated. The header information such as destination address, source address, packet number, and the text are software generated.

A typical packet format is shown in Figure 1.

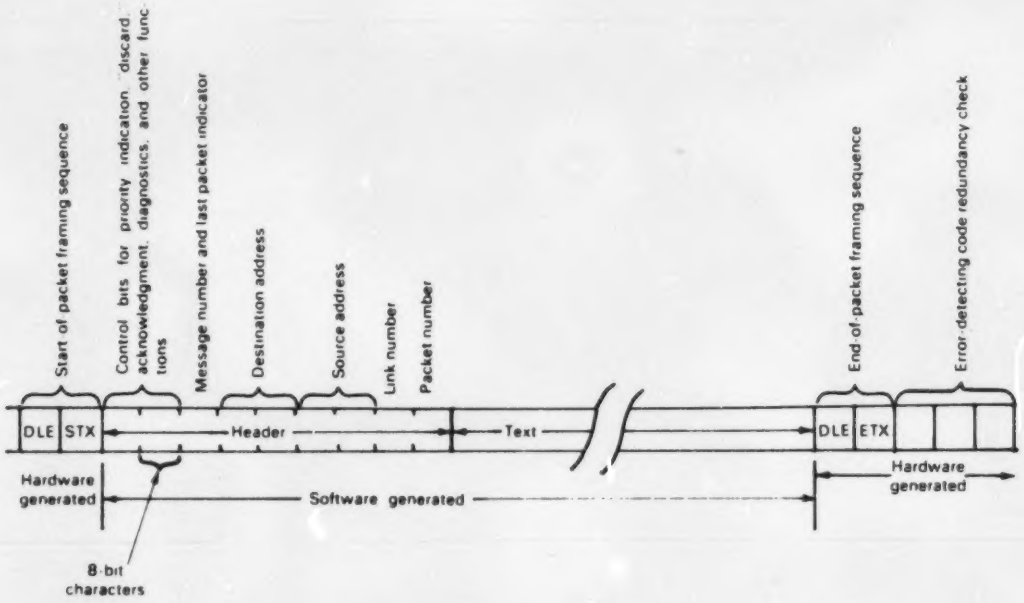


Fig.1 Typical packet format

Note: DLE means Data Link Escape; for further details, see page 500 of reference 6.
STX and ETX mean Start of Text and End of Text, respectively.

A network for packet switching is designed so that each network computer has the choice of routing. A packet, because of its small size, can be routed in a hurry over an optimum path in a fraction of a second. An optimum path is changing second to second because of the traffic conditions. In the early stages of development the packet-switching network was dubbed the "hot-potato" network because each network computer passes the packet onto the next as if it were handling a hot potato. Packets have a variable length because it would be uneconomical to pass largely unfilled packets, e.g., for a SELECT or DISPLAY command, that would use only a few characters or "bits" of space

In the early development stages it was recognized that packet switching was suited for short intermittent traffic, e.g., SELECT, COMBINE, or DISPLAY commands, as opposed to circuit switching which is better for long continuous data transmissions. A crossover point is projected at about 5,000 bits.[10]

At the moment all packet-switching applications for retrieval of technical information are limited to landlines, including microwave links. The use of satellite communication links for the type of information retrieval discussed in this section is projected for the early 1980s.

3.5 ARPANET[6,7,8,12]

The ARPA network or ARPANET is a distributed computer communications network developed by Advanced Research Projects Agency, a unit of the US Department of Defense. Initially designed in 1969, ARPANET's importance stems from its being the first large packet-switched network and its contributions to the concept of shared use of dissimilar computer resources. ARPANET's packets are routed from source to destination through nodes where Interface Message Processors (IMPs) make the individual packet path selections. Today ARPANET is operated by the Defense Communications Agency, and its network includes Department of Defense (DoD) and non-DoD activities in the continental United States, Hawaii, Norway, and England.

3.6 Commercially Available Packet Networks – Examples

3.6.1 TELENET[9,10]

TELENET is a packet-switched data communications service throughout the United States and other countries. It

provides asynchronous service up to 1200 bps and synchronous service up to 56 Kbps for programmable devices equipped with X.25 (the international standard) packet-mode interface. The packet-switching techniques developed for ARPANET were used for TELENET, which became operational in 1974. Examples of the TELENET charges (July 1980) for Public Dial-In Service (110–300 bps) for three typical European countries are as follows:

Country	*Subsc. Chg.*	*Conn. Chg.*	*Traffic Chg.*	*Tele Access Chg.*
Denmark	240 DKr/yr ($43.00 US)	75 DKr/hr ($13.50 US)	3.6 DKr/per 1000 char. ($.64 US)	0.5 DKr/min ($.09 US)
Italy	None	10,000 Lira/hr ($12.00 US)	500 L per 1,000 char. ($.60 US)	None
Spain	None	1,000 Peseta/hr ($14.87 US)	50 P per 1,000 char. ($.74 US)	Varies with distance from Madrid

TELENET became a subsidiary of General Telephone and Electronics in 1979 and is now sometimes called GTE/TELENET. The Telenet Network in the United States as of July 1980 is shown in Figure 2.

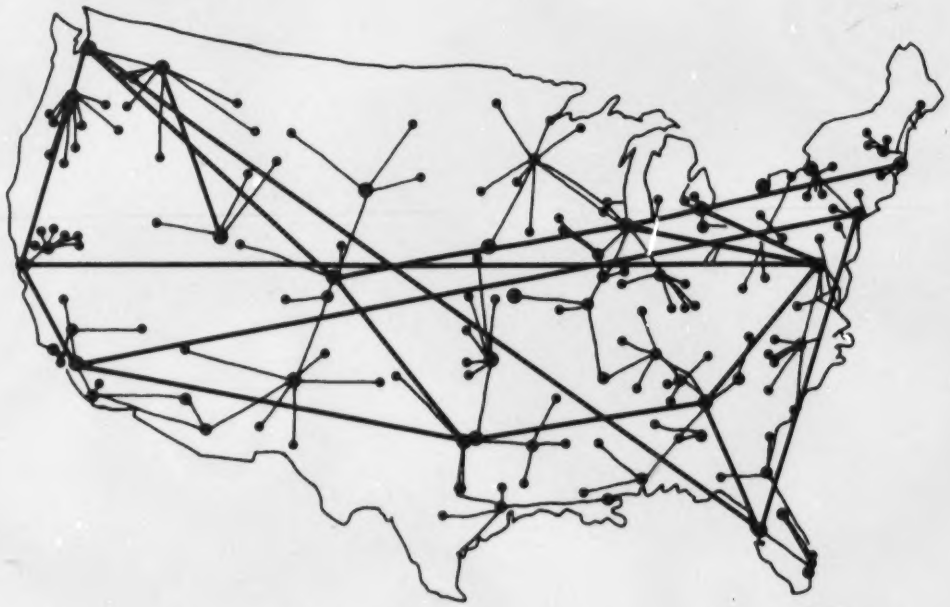


Fig.2 TELENET network (mid 1980)

3.6.2 *TYMNET*[13,14,15]

TYMNET is a commercial communications network that was originally designed by Tymshare to meet its own internal communications needs. It has been in service since 1971, and it was used publicly for the first time, in 1974, for the National Library of Medicine. Although somewhat similar to other packet networks such as ARPANET and TELENET, it has significant differences. Packets are utilized, but only as the carriers for virtual channels between neighboring nodes, and are not themselves "switched". The other major difference is that TYMNET packets can carry one or more sets of subscribers' data in the same packet. This capability permits the filling up of packets to reduce the cost. In other words, partially filled packets are costlier than full or nearly full packets to transmit between nodes. (A small packet costs the same as a filled-up packet to transmit.)

TYMNET covers the continental United States, Alaska, Hawaii, 14 countries in Europe, Argentina, Brazil, Australia, Hong Kong, Israel, Bahrain, Japan, Mexico, Canada, New Zealand, Philippines, Puerto Rico, Singapore, and Bermuda.

TYMNET's charges are competitive with other packet-switched networks' charges, both in the Unites States and other parts of the world.

3.6.3 EURONET

European Scene

The European scene of packet-switching public networks is dominated by the presence of EURONET, not only because it is the only network that is Europe-wide in operation, but also because it can certainly be considered both from the technical and the political points of view a major result of collaboration between the PTTs (Postal Telephone and Telegraph organisations) of European Community countries. Born under the auspices of and initially financed by the Commission of the European Communities (CEC), EURONET came into life for an experimental period of time at the end of 1979; it was officially opened for public use in March 1980 and is now an accepted point of reference for present and future developments in the area of data transmission in all European countries.

EURONET is often referred to as EURONET DIANE. DIANE is not a data base; it is simply an acronym meaning Direct Information Access Network in Europe. Figure 3 shows EURONET in its first phase of implementation.

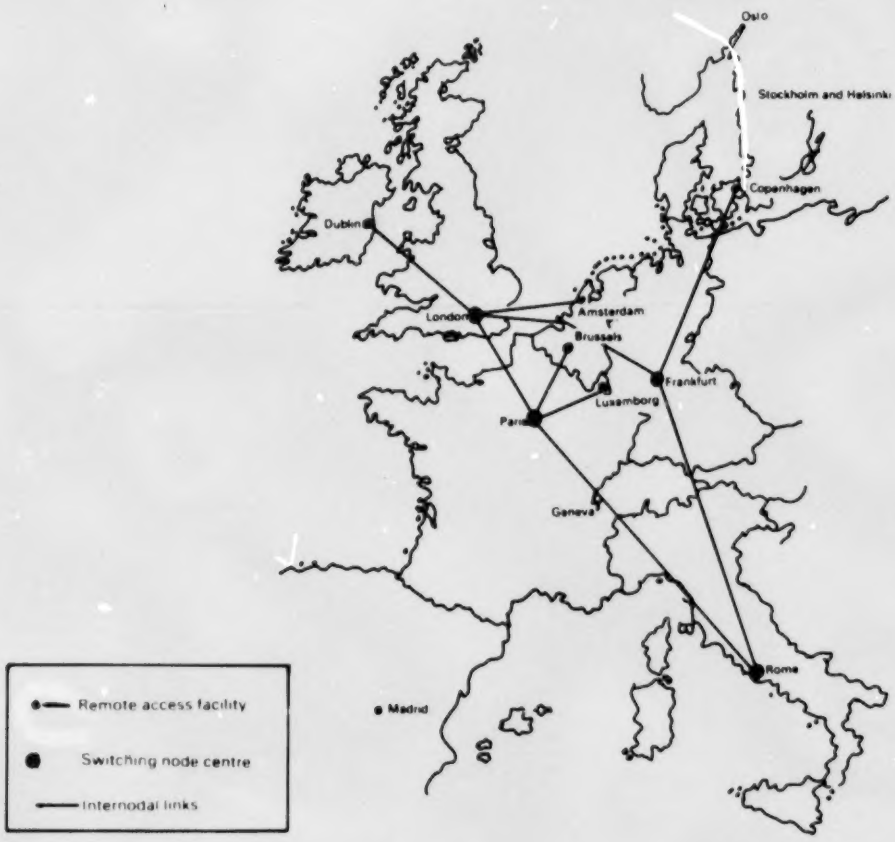


Fig.3 EURONET – Phase 1

Background

International standards have been agreed upon, established, and implemented after lengthy and often difficult negotiations. Although many improvements are possible and needed, the effect in the orientation of manufacturer's and user's choice is already becoming evident.

The main reason that led the CEC to promote a European common project in the field of data communications networks was a concern with the proliferation of private star-type networks, established mainly for information retrieval purposes. Large data bases were accessible only in their region, while the potential market extended far beyond local boundaries if there were a suitable access facility.

The terminal used varied, the information retrieval languages and searching methodologies also varied, each of the communications networks was different, often incompatible, and facilities were under-utilized. Early studies carried out by the Commission showed that the cost of a single online information network would be a sixth of the cost of several independent networks each directly operated by the data base suppliers.

It was decided, therefore, that a common approach would make better use of resources and that a packet-switching type of network would more effectively satisfy user needs. A consortium of European PTTs, led by the French PTT, took charge of the development and implementation of the EURONET project, with the aim of handing over its operations to national administrations when the installation phase was completed.

At the community level a launch team now exists mainly to coordinate the marketing efforts of all the computer hosts and resources connected to EURONET and to try to give a uniform image of the services offered. Network management is ensured by a management centre, located in the United Kingdom, while each PTT holds the responsibility for the nodes and concentrators installed in their respective countries.

These split responsibilities may create problems with customers, who sometimes do not succeed in finding the right answer or solution to their difficulties and who have to talk with different bodies at different levels, each referring to the next one in a possibly exhausting process. Nevertheless, all actions planned by the European PTTs cannot and do not ignore the presence of EURONET, and always face the problem of integrating it with their local facilities and building around it their national networks.

EURONET's Characteristics

EURONET comprises four main nodes, located in Rome, London, Paris, and Frankfurt, connected by lines operating at 48 Kbps, and a number of multiplexers in all the other capital cities of the European Community Member States organised in such a way that access procedures, from a user's point of view, are always the same, disregarding which particular equipment they are connected with.

The main traffic carried by EURONET is interactive interrogation of data bases by terminals working at speeds varying from 300 to 1200 bps, and the whole network design is tuned to this objective. Attempts and speculations directed to using it for bulk traffic, as for example primary document delivery to end users, points out basic difficulties in the present network organisation as in the limited bandwidth available and a tariff structure that leads to prohibitively high cost when the amount of data to be transferred becomes substantially higher than in a typical interactive environment.

Both packet-mode and character-mode terminals may access EURONET, the first category including all DTEs capable of directly exchanging packets with the network interface according to the procedure X.25. Along a single physical connection, several logical links or virtual circuits can be simultaneously established, theoretically up to 4096 but in practice limited by the number of parallel sessions that can be supported by the computer.

Character-mode terminals, including the majority of equipment installed in user premises, cannot directly access the packet sub-network as they do not have sufficient embedded intelligence to handle the required protocol, but are accepted by special devices that assemble individual characters into packets and forward them to the packet-switching sub-network along an X.25 path.

Such devices, called PADs, for Packet Assembly and Disassembly, have been installed and are operated by PTT administrations in all countries of the European Community and now tend to be more densely clustered where the presence of an adequate terminal population may justify their use. Character-mode terminals access PADs according to a protocol defined as the CCITT X.28, whose use is very similar to the well-known notion of the teletype compatible node.

Although the tariffs for the international trunks of the network have been commonly agreed upon and are distance independent, each nation has reserved the right to apply its own regulations as far as domestic fees are concerned. The scene varies widely from country to country, from situations where a toll-free telephone call is always granted to the nearest network access point, to conditions where the full tariff is always charged. Sometimes this creates unbalanced situations for competitors who suddenly find themselves in a priviliged position, mainly where alternative networks or access facilities are provided.

The Interconnecting of Networks in Europe

As soon as more than one public network is present in a country, the PTT is invariably urged by users to find ways of interconnecting them. The advantage for the user is in having only one interface for all his networking requirements, while the PTT can plan towards an economy of operations that makes maximum use of shared resources.

The interconnecting of networks is not a straightforward exercise, as often completely different technologies are involved, and even when the networks to connect are very similar, problems arise that were not anticipated in the original network design, leading to the implementation of machinery of doubtful reliability. Where this problem is concerned, the case of a network being compatible with itself can be regarded as being more the exception than the rule.

The connection between EURONET and TRANSPAC, the national French packet-switching network, was always regarded as a necessary and expected step as soon as the two networks were open. Their hardware is the same, as well as the basic software, and their design is largely similar; therefore, the difficulties for a complete interconnection were anticipated as negligible.

In fact, once the basic problems, such as the mapping of the two address spaces, the correlation of the flow and error control procedures, and the sharing of incomes had been solved, new and more subtle situations were discovered where these mechanisms, although individually working perfectly, did produce unexpected failures. Fortunately these errors were rare, but still it was annoying when, for example, a subscriber suddenly found himself in someone else's session.

These and other similar problems are rather common in the implementation of GATEWAYS, the devices designed to bridge one network to another. Nevertheless, the gateway between TRANSPAC and EURONET is extensively used both by French subscribers wishing to access EURONET hosts and vice versa by all European users who want to consult a French host.

Being the first public packet-switching network offering X.25 interfaces to be installed in Europe, TRANSPAC has already established a number of gateways with other networks. For example, to EURONET, the Spanish RETD, the British EPSS, TYMNET, and via TYMNET to TELENET and the Canadian DATAPAC.

All these interconnections could technically allow traffic to go anywhere, crossing multiple boundaries, possibly reaching the same degree of flexibility as the international telephone network. In reality, administrative barriers are raised across the majority of fanciful routings, as no international agreement yet exists on tariff structures, transit rights, and invoicing procedures for data traffic.

As with telephone traffic, it is to be expected that conventions will be established only by bilateral agreements between the PTTs involved, but the process may be very long and introduces delays that do not match the rapid growth of demand so characteristic of data traffic today.

The requirement for the PTTs, in their appropriate international bodies to reach a global solution in a reasonable time, is now far more than a desire of data communications users – it is a real need.

4. SELECTED EXTERNAL DATA BASES IN THE USA

Data base searching, online or interactive, is the most efficient and convenient way of locating research, applications, business, and other kinds of literature-related information. The searches are carried out by means of an inexpensive terminal located in the library, information center, business office, or even in the home.

All that is required is an appropriate terminal, a telephone, and an identification number that is supplied by the vendor. You begin by dialing a telephone number in or near your own city. Within seconds, after you have identified yourself, you can begin searching files representing millions of articles, books, current and completed projects, and other kinds of information. You may view your search results by printing parts (e.g., titles, authors, abstracts) or all of some citations at your terminal. After review, you may revise your search with different combinations continuing to build up on results achieved. Upon completing your search activities, you may print the results online or, if the output is large, you may prefer having it printed offline and mailed to your address.

There are in excess of 215 data bases available for online search in the United States, and the number increases monthly. For most of these data bases, there are three price elements: (1) computer time for the period that you are connected, (2) communications usage, and (3) offline printing, if requested. The online computer and the offline printing rates may vary with each data base searched.

A comprehensive listing of 528 data bases is contained in "Computer-Readable Data Bases – A directory and Data Source book". See Reference 16.

The three major search systems are operated by the US Government.

NASA/RECON System
NASA Scientific and Technical Information Facility
P.O. Box 8757
Baltimore/Washington International Airport, MD 21240

DOE/RECON System
Department of Energy
Technical Information Center
P.O. Box 62
Oak Ridge, TN 37830

Defense RDT & E On-Line System
Defense Technical Information Centre
Cameron Station
Alexandria, VA 22314

The three major commercial vendors of scientific and technical information in the Unites States are:

Lockheed Information Systems
(Search System – Dialog)
Department 50–20
3460 Hillview Avenue
Palo Alto, CA 94304
Telephone: 415-858-3785

Bibliographic Retrieval Services, Inc.
(Search System – BRS)
702 Corporation Park
Scotia, NY 12302
Telephone: 518-374-5011

Systems Development Corporation
(Search System – Orbit)
2500 Colorado Avenue
Santa Monica, CA 90406
Telephone: 213-829-9463

4.1 NASA/RECON System[17]

RECON's name is formed from the first syllables of two words that describe the system's chief distinguishing feature: REmote CONsole. The console, or terminal, is similar to a typewriter and is operated by the user. RECON terminals are linked by telephone lines to the central computer in the NASA Scientific and Technical Information Facility. A simple command language typed on a RECON terminal enables the user to communicate with the computer. Terminals may be equipped with a teleprinter, and/or a cathode-ray tube (screen), to print or display both the information requested by the user and any messages sent to the user by the computer.

The information retrieved by RECON is in the form of citations that describe technical publications. There are well over one and a half million reports, journal articles, and miscellaneous documents of worldwide origin that are of special interest to the aerospace community. The major document series accessible on RECON are:

Scientific and Technical Aerospace Reports (STAR)
International Aerospace Abstracts (IAA)
Limited Scientific and Technical Aerospace Reports (LSTAR)
Unannounced Documents of Limited Significance
NASA Research and Technology Objectives and Plans Summary (RTOPS)
NASA R&D Contracts Search File
Computer Program Abstracts (CPA)
NASA Tech Briefs
NASA Library Collection

RECON's potential is broad. With appropriate computer hardware resources, the number of terminals can be increased several fold without introducing appreciable delays in response. In addition, the system is capable, with appropriate storage and computer capacity, of handling multiple collections of information, each with its own unique vocabulary, data elements, and descriptions.

The central data base is now accessible on RECON, Monday through Friday, between 8 a.m. and 7 p.m. EST or EDT.

4.1.1 NASA/RECON Language

RECON command language enables the user to contact and interact with the central computer. The commands perform specific functions designed to assist in the search, retrieval, and display of RECON data. Most commands consist of an easily remembered *command* and a variable *operand* chosen by the user. The command language makes extensive use of mnemonic names and acronyms and is almost entirely verbal. A RECON feature permits the user to ask for explanations of the various commands as he conducts his search.

There are four general types of instructions in the RECON command language. Most are concerned with directing a specific search (EXPAND, SELECT, COMBINE, FREQUENCY). Other commands enable the user to view and obtain printouts of the material located during a search (Specify-Format, Display, Print). A third category provides instructions or assistance in using RECON (Search-Status, Help). The fourth group performs a variety of "housekeeping" functions such as beginning and ending a search and providing information about the user (BEGIN-SEARCH, SIGNON, END).

A RECON command consists of the command code followed by an *operand* that further specifies the action to be performed. The operand may be omitted, as in BEGIN-SEARCH, or it may range from a single word to a complex series of specifications. The operand is generated by the user.

COMMAND	OPERAND
SELECT, or S	SPACECRAFT
COMBINE, or C	1 * 2
EXPAND, or X	SUBSONIC

4.1.2 NASA/RECON Logical Operators

The symbols (*), (+), and (–) represent the Boolean operators, AND, OR, and NOT. COMBINE commands are Boolean expressions.

AND (*): The command "C 1*2" results in a new set that contains only those items that are common to both set 1 and set 2.

OR (+): The command "C 1+2" results in a new set that contains items that are in set 1 but not in set 2, items in set 2 but not in set 1, and items that are common to both sets.

NOT (–): The command "C 1–2" results in a new set that contains only the items in set 1 that are not in set 2. The command "C 2–1" produces a set containing items from set 2 that are not also in set 1.

4.1.3 Index Terms

An index term is an alphabetical term from one of RECON's inverted files. The inverted files are indexes of various kinds of information, such as subject, author, or publisher. Each index is related to a number of accessions from the RECON data base and also to other index terms that are similar in meaning or spelling. A user can enter an EXPAND command with an index term, or any term of his choosing. RECON displays terms that are alphabetically adjacent to that term, and the user can then choose those displayed terms that he considers appropriate to his search effort.

4.1.4 NASA Thesaurus

The NASA Thesaurus is an alphabetical listing of subject terms including postable and nonpostable cross references; it is online. The EXPAND command can be used to call out from the thesaurus a display of an index term with other index terms related to the term selected. This feature is particularly valuable to the user who is looking for terms to enhance his search effort.

At the present time the NASA Thesaurus has 16,367 postable and 3660 nonpostable entries.

4.1.5 Text Search

Most of the file collections in the NASA/RECON SYSTEM contain fields of information that are text searchable. This means the user can locate citations that contain selected words, phrases, or combinations of words in "proximity" relationship in a specified field. The fields available for text searching may include titles, title supplements, abstracts, analytic notes, and other fields of importance in the book file collection.

Access to the text-searchable fields must be executed with specific field prefixes (mnemonics) attached to the word or phrase being SELECTed. These may be prefixes for individual fields or an "ALL" text field prefix to include more than one field.

Alphanumeric terms as well as numeric terms containing a decimal point may be SELECTed within a searchable text field. For example, citations containing "F-15 Aircraft" or "1.06 Micron" may be quickly located by text search of the title field.

Appendix E, NASA/RECON System User's Manual, lists all field mnemonics for text – and nontext-searchable fields in the NASA file collections.

4.1.6 Availability of NASA/RECON

Eligible domestic organizations desiring RECON terminal service should submit requests in writing to the Scientific and Technical Information Branch at NASA Headquarters, Washington, D.C. European requests should be directed to the European Space Agency.

4.2 DOE/RECON System[18]

DOE/RECON was initially developed by Lockheed for NASA. It was purchased by the US Atomic Energy Commission to support the Nuclear Science Abstracts data base to be used by a small number of terminals. The system was installed at Oak Ridge National Laboratory in 1970–71. Near the middle of 1975, dial-in access to the system was initiated on an experimental basis. Since early 1976 it has been offered as a regular service.

DOE/RECON is used primarily by technical librarians, technical information centers, and scientists and engineers for performing literature searches. The system may be reached by dedicated telephone lines connected directly to the computer site, or it may be reached by dial-in procedures through commercial telephone lines.

4.2.1 DOE/RECON Command Language

The command language of DOE/RECON is essentially that used in the NASA/RECON. A command consists of a command code followed by an operand that further specifies the action to be performed. The command codes used in DOE/RECON are symbolic, and the symbols are not interchangeable with the English word denoting the symbol. Example:

COMMAND	SYMBOL
BEGINS	!
EXPAND	"
SELECT	#
COMBINE	$

The use of symbols should be easily mastered by the user after a few sessions on the terminal.

4.2.2 DOE/RECON Logical Operators

The Boolean logical operators, (*) meaning AND, (+) meaning OR, (–) meaning NOT, are used in the symbolic form. They are not interchangeable with the English word.

4.2.3 Availability

Telephone access to DOE/RECON is available to domestic contractors with the Department of Energy and to other US Government agencies on request.

Current planning is directed toward making the Energy Data Base (EDB) tapes available to the major US commercial vendors by the end of 1980. The EDB includes all current information of interest to the Department of Energy, and older information in selected areas is being included as time permits. The aim is to build a complete data base for various energy fields. All unclassified technical information being processed at the Technical Information Center, including nuclear information, is added to the EDB file. This includes information announced in *Energy Abstracts for Policy Analysis, Energy Research Abstracts, Solar Energy Update, Fossil Energy Update, Controlled Fusion Update, Energy Conservation Update*, and *Geothermal Energy Update*.

4.2.4 Energy Data Base (EDB)

The unit record for each item has an accession number, title, author, complete bibliographies information, subject descriptors, subject categories, and abstracts. The bibliographic information for journals includes the title, CODEN, volume, issue number, pages, and date; for reports, it includes institutional name, availability, and price.

The EDB file contains material dating back to the late 1800s. Semi monthly updates consist of approximately 6,500 citations.

4.3 Defense RDT&E On-Line System[19]

This system is the resource for information on the Department of Defense's Research, Development, Test, and Evaluation activities. It provides data on all stages of defense research and development planned work, work in progress, and work completed or terminated.

Data in the system include information classified through secret. Classified information is accessible only through specially protected terminals, and while the total system is available to both DoD organizations and contractors, contractors do not have access to all of the data.

Through the *Program Planning File* the user may rapidly identify the R&D programs of specific agencies or compare the related ones of different agencies. A particular feature is its ability to quickly sum the funding estimates for any number of programs.

The *Work Unit Information File* provides access to information on all DoD research before it is formally reported in technical reports or the periodical literature. A particular feature is its ability to quickly sum the 5-year resource estimates of funding and man-years for any number of work units.

The *Technical Reports (TR) File* contains information that describes what a report is about, who did the work, and for whom. It tells where the work was done and when it was reported. It provides report numbers, project numbers, and contract numbers, as well as other numbers used to identify the report.

The *Independent Research and Development (IR&D) File* provides brief management and technical status data on contractor's independent research and development effort that is not sponsored by or required in the performance of a grant or contract. It identifies who is doing what research when, where, how, and at what level of effort.

4.3.1 Defense RDT&E On-Line System Language

RDT&E command language is of two types – *Expanded Commands* and *Abbreviated Commands*. Expanded commands are English language phrases composed, in almost all instances, of a verb, an adjective, and a noun.

Search Technical Reports
Qualify Search Results

Abbreviated commands are contractions of the expanded command. They are entered along with search strategy, elicit a speedier system response, and require less time and effort.

S T R
Q S R

4.3.2 Defense RTD&E On-Line System Logical Operators

The Boolean Operators AND, NOT, OR are used in their word form. Symbols are not used as logical operators. Search options include

HIERARCHY
MASK (Term Root)
WEIGHTED TERM
TERM ROLE (Field Identification Code)

Unlike most online search systems, the RDT&E system does not generate numbered SETS of citations indexed to or containing a selected term. The entire search strategy must be entered at the terminal, where it is displayed on a cathode-ray tube. A printer is provided at the terminal site, and the display may be printed to create a record of what the user has done. When the user is completely satisfied with his search strategy as displayed, the final entry END is typed.

Up to this point the computer doesn't know what you want or what you have been doing. Your instructions as displayed are sent to the computer by depressing the TRANSMIT key. The computer will return a message visible on the cathode-ray tube, which will be a page of statistics presenting the "FINDS" resulting at each level of your search strategy. These "FINDS" represent the number of accessions that have been retrieved. These may be displayed, printed at the terminal, qualified in a number of ways by the user, or ordered printed offline by the computer.

4.3.3 RDT&E On-Line System, Text and Title Searching

The system incorporates a text searching capability that allows the user to examine the title and/or the abstract of all citations resulting from an index search. The user can command the computer to examine the text of these citations for the occurrence of specific words or phrases that will refine the search output further.

Search for documents with known titles is possible in the technical reports data file. The user enters the appropriate role code and the full title, and the computer searches the entire TR file and returns a message showing the number of FINDS.

4.3.4 Printing Search Results

The citations desired by the user may be printed online at the terminal printer. A continuous print capability has been provided at the option of the user. Offline printing may be directed if the user wishes. When so directed, the search results are printed at the computer center and mailed to the user at the address of his terminal.

4.4 Lockheed Information System – DIALOG

The DIALOG Information Retrieval Service, from Lockheed Information Systems, has been serving users since 1972. In early August 1980 there were in excess of 110 data bases available on the system, and additional bases are added periodically.

The data bases on the Dialog system contain more than 35,000,000 records. These can range from a directory-type listing of specific manufacturing plants to a citation with bibliographic information and an abstract referencing a journal, conference paper, or other original source.

The DIALOG system uses IBM 360/65 computers located at the Lockeed Research Laboratory in Palo Alto, California. The system can be accessed through several communication systems. The most commonly used means are direct distance dial over standard telephone lines, dialing the nearest access point of a special network (TYMNET or TELENET), and teletypewriter service. The most frequently used service is 30 characters per second (cps), but service is provided at 10 cps and 120 cps. All data bases available on this system are accessible Monday through Saturday in accordance with a published schedule.

4.4.1 DIALOG Command Language

Dialog accepts commands in three operational forms: word, letter(s), or symbolic abbreviations. For Example:

SYMBOL	NATURAL LANGUAGE	ABBREVIATION
"	EXPAND	E
#	SELECT	S
$	COMBINE	C

Each can be used on all bases in the Dialog system. A number of others complete the total command options and are to be found in *A Brief Guide to Dialog Searching.*[20]

4.4.2 DIALOG Logical Operators

The Boolean operators

SYMBOL	NATURAL LANGUAGE
*	AND
+	OR
–	NOT

are used in the Dialog system. Either symbols or natural language can be used, separately, or together, in a *Combine* operation.

4.4.3 DIALOG Retrieval Methods

Full-text searching capability is available on all Dialog data bases. This permits the user to retrieve citations using multiword search terms (either free terms or thesaurus descriptors) from the suffix fields. The full-text searchable fields are identified with suffix codes, and may include the title (/Ti), descriptor (/DE), identifier (/ID), corporate source (/CS), abstract (/AB), and others. It is important that the user be aware that the full-text searchable fields can vary with each data base chosen.

Quick identification of the searchable fields can be made online by asking the computer with a simple command ?Fieldn or by referring to *Guide to Dialog Data Bases* for the particular data bases being searched. In the first case, the computer inquiry will result in a display of the searchable fields and the two-letter suffix code used for field identification.

4.4.4 Formats for DIALOG Search Results

A fully formatted citation from the Dialog System consists of the full citation with abstract. Other formats that can be requested by the user include Dialog accession number only, full citation without abstract, and citation title with accession number. In the absence of a specified format, the citation will be displayed or printed without an abstract.

4.4.5 Display and Printing Search Results

Several different commands can be used to present the results of a search:

Display, D – used with video-style terminal for online presentation on the cathode-ray tube. When used with the typewriter-style terminal it will result in a printout by the teleprinter.

Print, PR – used for requesting offline printing.

Print (Key) – the current display on a cathode-ray tube can be printed by the teleprinter by pressing the *Print* key on the terminal keyboard.

4.5 System Development Corp. – SDC ORBIT[21]

ORBIT had 62 data files available for machine search on 1 August 1980. These may be broadly grouped under the headings of:

SCIENCE AND TECHNOLOGY
SOCIAL SCIENCE
BUSINESS

All the user needs to conduct searches on ORBIT is a terminal, a telephone, and a user identification number provided by the company. The computers are located in Santa Monica, California.

Users may access the SDC computer in either of two ways: (1) by direct dial; or (2) through communications networks, TYMNET or TELENET.

4.5.1 Searching on ORBIT

Searching on ORBIT is done interactively, i.e., in a conversational mode, with the searcher and the program taking turns. To make the conversation easier to trace on your terminal paper or screen, ORBIT prints the cue "USER:" when it is your turn to make an entry, and "PROG:" when the program is responding.

Interaction with ORBIT will include three kinds of "Conversation": (1) searching (called search statement); (2) instructing (called commands); and (3) answering questions (asked by the program).

ORBIT is always set to search, so no special instructions are required when you enter a search. You simply key in the term or terms, in the appropriate format for a given data base, and ORBIT will try to match the search specifications. The results of the search will be reported with a message that indicates the number of records that ORBIT was able to find and the SEARCH STATEMENT NUMBER that has been assigned these results.

For example:

SS 1/C – – – (The computer is ready for first SEARCH STATEMENT)
USER: (User enter SEARCH STATEMENT)
EARTHQUAKES AND CALIFORNIA
PROG: (Program responds with results)
SSI PSTG (346)

The next readiness cue is then given the next higher number – – up through 30. These search statements are very useful in both searching and printing, because they allow you to refer back to previous search statements at any time and to use those statements in new statements that can be designed to combine or qualify them as desired by the user.

4.5.2 Tutorial Assistance on ORBIT

Tutorial assistance is readily available on ORBIT. The simple command

SS 1/C?
USER:
EXPLAIN EXPLAIN

results in a list of the following items that may be explained online.

For example:

SS 1/C?
USER:
EXPLAIN EXPLAIN

PROG:
THE FOLLOWING ITEMS MAY BE EXPLAINED ONLINE BY ENTERING THE EXPLAIN COMMAND WITH THE ITEM TO BE EXPLAINED, E.G., EXPLAIN COMMANDS: EXPLAIN FILE.

1. COMMANDS
FILE, FIND, HISTORY, NEIGHBOR, PRINT, STOP, BACKUP, ERASEALL, KEEP, RESTART, STRINGSEARCH, SUBHEADINGS, SAVE, SAVEOLD, STORE, STOREOLD, SDIPROFILE, MESSAGE LENGTH, RENAME, SECURITY, STORAD, SYNONYM, TERMINAL LINESIZE, TERMINAL PROFILE, COMMENT, EXPLAIN, ORDER.

2. PROGRAM MESSAGES
CONTINUE ENTERING SS N, DESIGNATE, MM (TERM) (N), NO MATCH, NO PSTG (TERM), (N) SEARCHED (N) MATCH, PSTG, SS N/C?, TIME OVFLW, TOO MANY PSTGS IN ALL SS, TOO MANY PSTGS IN THIS SS, TOO MANY SS, TOO MANY TERMS, TRUNCATION TOO GENERAL, UP N.

3. ONLINE TUTORIALS
LOGICAL OPERATORS, ERRORS, SYSTEM KEYWORDS, NESTING, IMPLICIT NESTING, LONG SEARCH STATEMENTS, ORBIT IV, RANGING, STACKING, TRUNCATION, UNIT RECORD.

4. INFORMATION
SCHEDULE, PRICES, TIME, TRAINING, TRAINING EAST, TRAINING WEST, TRAINING MIDWEST, TRAINING EUROPE, TRAINING CANADA, SDI PRICES.

THE FOLLOWING ARE COMMANDS USED TO OBTAIN SYSTEM INFORMATION: THEY ARE NOT USED WITH THE EXPLAIN COMMAND BUT ARE ENTERED ALONE. HELP, FILES, UPDATES, NEWS.

4.5.3 Understanding the Boolean Operators

ORBIT uses the three Boolean operators: AND, OR, NOT. No other operators – symbolic or numeric – may be used. Several terms may be entered in one statement with one or more Boolean operators. ORBIT will perform the AND and NOT function before it does the OR part of the SEARCH STATEMENT. Up to 30 SEARCH STATEMENTS per data base may be entered during a search session.

4.5.4 ORBIT Quick-Reference Guide

The user of ORBIT should be provided a copy of ORBIT QUICK-REFERENCE GUIDE. This guide provides a summary of ORBIT search procedures and a brief description of all the publicly available data bases. The data base guide consists of four sections:

General Description: Basic information concerning the data base is given, including supplier, printed publication, subject coverage, period of coverage, unit record, size of file, and updating frequency.

Sample Record: A unit record from a PRINT FULL is given to illustrate the range of fields in a given data base.

Unit Record Description: A chart is given illustrating the field names and abbreviations organized by those that are subject searchable, non-subject searchable and not directly searchable. Also noted are the fields that print in the standard formats.

Searching Tips: Sample search entries are given for each of the key searchable fields.

4.5.5 Availability of ORBIT

The SDC Search Services specifies that data bases will be available on a nonguaranteed access basis a minimum of 6 regularly scheduled hours a day, 5 days a week, Monday through Friday, except for SDC holidays to be designated prior to the first day of each calender year. Beginning 1 July 1980, ORBIT has been made available for 22 hours each day Monday through Thursday, Midnight – 8 p.m. on Friday, and 8 a.m. – 7 p.m. on Saturday.

4.6 The Bibliographic Retrieval System – BRS Data Bases[22]

There are many different data bases available for online searching on the BRS system, and all have been converted into a common format for searching.

There are three possible types of access methods that can be used to reach BRS computers located in Scotia, New York.

1. TELENET public dial service
2. TELENET IN-WATS service
3. Direct dial service

The TELENET network permits a user to dial a number and then be switched to the BRS computer at hourly rates significantly lower than normal direct dial service.

BRS is a general purpose interactive program that provides for both online and offline searching of bibliographic data bases. The dialog is short, simple, and easy to learn. It consists *entirely* of ENGLISH language words. No numeric or code representation is used.

The full BRS dialog has been abbreviated to further enhance its simplicity. The tutorial information that originally was routinely printed along with each system message was removed from the original version to save interaction time at the online terminal. The beginning user must rely on the BRS system manual to provide the additional tutorial information necessary to interact with the system. All users, after only a few sessions at the terminal, should find it very easy to manipulate the system to produce desired retrieval results.

4.6.1 BRS Logical Operators

Searchers can express the relationship that they desire between entry terms by using connectors called operators.

There are two types of operators available to the BRS searchers:

1. The standard Boolean operators
   AND (A and B in same document)
   OR (A or B or both in same document)
   NOT (A and not B in same document)
   XOR (Either A or B but not both)
2. Positional operators
   The following special operators are available to BRS searchers to indicate more precise positional relationship between terms:
   SAME (A and B in the same paragraph)
   WITH (A and B in the same sentence)
   ADJ (A adjacent to B in that order)

4.6.2 The BRS Loading Program

The information in each document loaded into the BRS system is divided into separate *paragraphs*, labeled with two alphabetic characters, (e.g., TI for title, AU for author) so that the user may elect to print only certain parts of each document and, most importantly, so that the user may qualify a search by requesting that the terms that are entered be found in a specific paragraph within a document.

The maximum number of paragraphs into which a document can be divided is 26. The actual number of paragraphs selected for each data base depends on the amount of information available for each document in that base. For example, each document in the ERIC data base has been divided into 19 separate paragraphs of information. There are only seven separate paragraphs of information in the INFORM data base.

The paragraph breakdown for each of the BRS data bases is provided as the cover sheet for the data base specific search guides. All the guides are arranged separately at the end of the BRS manual, and they should be consulted when searches are being performed to ensure that the appropriate paragraph labels are entered in print and search qualification requests.

4.6.3 Availability

As of August 1980, BRS includes 28 data files available for online searching. The system is available Monday 8:30 a.m. to 8:00 p.m. Eastern time and 8:00 a.m. to 8:00 p.m. Tuesday through Friday. The user is charged for the actual connect time plus a nominal charge for each citation printed offline. The rates vary with the choice of data file searched.

5. SELECTED EXTERNAL DATA BASES IN EUROPE

Most, if not all, of the major US commercial online vendors (including Lockheed Dialog, Systems Development Corporation, Bibliographic Retrieval Services, the New York Times Information Bank, etc.) may be accessed from locations in Europe via the TYMNET and TELENET networks.

In addition, Europe has developed its own online information services. The Information Retrieval Service of the European Space Agency first introduced its online service in 1969, and this operation has since been developed into the largest such service outside the United States. DIMDI, the German Institute for Medical Documentation, also has several years of operational experience and, like IRS, has developed its own searching system.

A number of European online services are detailed in this section. It was impractical to inlude them all, and those selected are included by virtue of being long-established major services, because of their importance nationally, or as a result of the interest surrounding their announcement.

The Commission of the European Communities at the official opening of EURONET on 13 February 1980, announced that the online host information services shown below were already connected to EURONET.

BLAISE	United Kingdom
DATACENTRALEN	Denmark
DIMDI	Germany
EPO	(European Patent Office) Netherlands
FIZ-TECHNIK	Germany
INFOLINE	United Kingdom
INKA	Germany
IRS	(European Space Agency) Italy

JRC	(CEC Joint Research Centre) Italy
SPIDEL	France
TELESYSTEMES	France

In addition, the services that had already announced their intention to connect to EURONET would more than double this number.

5.1 ESA/IRS – The European Space Agency's Information Retrieval Service

The service was originally introduced in 1964 as a joint service of the European Space Research Organisation (ESRO) and the European Organisation for the Development and Construction of Space Vehicle Launchers (ELDO) under the name of the Space Documentation Service (SDS). The creation of the European Space Agency in 1975, with programmes in the wide field of applications in addition to a purely scientific mission, resulted in considerable extension of the subject coverage of the online service, and in 1978, SDS was given a new name. The intention was to reflect the wide range of scientific and technical information and services that were, by then, available from this Department of ESA responsible for STI and other information and data facilities. The new name chosen was IRS – Information Retrieval Service.

ESA/IRS operates an online interactive search system for 10 hours daily on all working days. Some 25 major scientific and technical bibliographic data bases plus four specially developed data banks total over 16 million records online at all times. ESA/IRS is the only European online service to offer the NASA Aerospace data base (STAR and IAA) under the terms of the NASA/ESA information exchange agreement. Two data bases each now exceed four million bibliographic references (Chemical Abstracts and PASCAL-Bulletin Signaletique) and are believed to be the largest online data bases of their type in the world. Each data base is updated monthly. Searching may be via a controlled vocabulary, if available, and/or via the natural language of title, title extension, abstract, uncontrolled terms, or any other desired data element. A special numeric range search command has been developed for use with the data banks.

In parallel, an extensive STI network has been built up and provides direct online access to the IRS computer from all ESA member states and from several non-member states. Well over 10,000 kilometers of leased telephone lines stretch from Stockholm in the north to Rabat, Morocco, in the south. This network supports high-speed 2400 bps (240 char/sec) video terminals equipped with 190 line/minute printers multi-dropped directly, and lower-speed 300 to 1200 bps dial-in terminals via remote concentrators, provides remote offline printing via medium-speed printers, and is used by the Agency for various purposes, including facsimile transmission and computer-to-computer links. Other networks including EURONET are interconnected to provide more access points and backup redundancy.

By 1980, more than 1500 users of the ESA/IRS system, with constant additions throughout currently 13 European countries, one North American and one North African state, demand continuous support as facilities are improved and new data bases are added.

Two hundred hours of connect-time were being logged every working day whilst the offline printout volume, printed remotely in London and Paris for all users outside Italy, necessitated the introduction of a new remote printing station near Amsterdam.

The original online system, known as ESRO-RECON, was based on a system design conceived by Lockheed in the late sixties. Ten years later the RECON system was being asked to support more users and more data than its designers had ever contemplated. The Agency's Information Retrieval Service had been continuously developing the original computer software in order to accommodate more files, new kinds of data, simpler and more powerful user features, and so on. It was clear by the early seventies, however, that the original design concepts of the system had been far exceeded and that the law of diminishing returns was beginning to apply.

During the latter part of the seventies, IRS developed an entirely new software system intended to replace RECON. This development took time because it had to be carried out in parallel with the development of the existing operational system, which could not be allowed to stagnate, and with the continuing constant workload associated with updating all the existing files each month with newly arriving data.

Various elements of the new online retrieval system, known as QUEST, were under test by early 1979, and implementation of the complete new system was finally completed by October of that year.

A number of important objectives played a fundamental role in the establishment of the design concepts for the new system. QUEST has been structured to support a larger number of users simultaneously, while at the same time improving the queuing time and eliminating the peak-load effects that slowed response for all users of the old system. The new system also has provision for multiple command sets or languages. (The command sets are the instructions that must be typed on the remote terminal by the user, e.g., 'BEGIN2' instructs the computer to switch into file number 2 and prepare for a search, 'DISPLAY' instructs the computer to display an item on the user's remote terminal, and so on.)

IRS will continue to support fully and further develop the familiar command language of the previous system, since this is already known and employed by more than 1500 regular users. The first new command language introduced is that defined for the European Commission's EURONET network, to which many new European online services are expected to connect. The concept here is one of a Common Command Language, known as CCL, that, once learned, can be used on any of the various systems. A third command language is also being developed to support a bilingual Arabic/French data base under contract to an organisation in Morocco.

QUEST has also been developed to support the online entry of local data. With this service the remote data terminal may be used not only for information retrieval, but also for the input of data for private files. Such data can be recalled via the remote data terminal, edited or replaced, while still being safeguarded by security procedures.

A multi-alphabet terminal called the 'EURAB terminal' has been developed in parallel with QUEST by IRS. This terminal is capable of displaying two texts in different alphabets side by side on the same screen (the first alphabet pair will be Latin/Arabic). It employs standard ASCII coding, and other alphabets can be readily accommodated, e.g., Greek. QUEST will permit the full potential of the new terminal to be realised. Input of data for the Arabic Lexicon (LEXAR) has already begun from the IERA Institute in Rabat. Lexar files will contain both English and French equivalents of Arabic words and phrases.

Recently, an online order facility has been implemented that enables a user to order any original document announced in several of the files by means of a quick and simple operation at the terminal. There has been demand from both users and data base suppliers alike to extend this feature to other files. For those users who require absolute security to surround their online file access, a "TOP SECRET" command has been introduced that renders it quite impossible for anyone at the IRS computer centre to know what search the user is executing; no record is accessible other than by the user, and this is destroyed instantly at logoff or if a break of any kind occurs.

The majority of ESA member states national aerospace documentation and information centres are permanently linked to ESA/IRS by means of dedicated leased-line display terminal.

The first such "external" terminal was installed in 1970 at the Technology Reports Centre, near London, and was quickly followed by one at ZLDI (Zentralstalle für Luft- und Raumfahrt Dokumentation und Information), Munich. By the end of 1975 some 20 high-speed leased-line video terminals had been installed in the member states.

The latest version of the IRS dedicated high-speed terminal, named TEL-42, operates at 240 char/sec and is equipped with a 190 line/minute printer. The terminal functions in page mode, which means that it starts writing at the top of the screen and stops when it reaches the bottom (i.e., no data are lost as a result of "rolling off the top"). Two pages may be displayed side-by-side.

These terminals have their own permanent work storage areas allocated at the computer, which means that searches or other material developed online may be stored as long as required. They may be switched to Input Mode and used as direct entry online input terminals supported by the IRS ODE or online data entry system. The Tel-42 terminal may, in addition, be used in dial-in mode at speeds up to 120 char/sec. Overall, this device is a most sophisticated and flexible terminal.

In addition to the provision of a service to the national aerospace centres, ESA/IRS is very extensively used by companies and organisations involved in aerospace and aerospace-related fields throughout Europe (and by many clients quite outside aerospace!). A recent study of the data bases most used by the European aerospace community showed that heaviest use was in the NASA, Chemical Abstracts, and INSPEC data bases, followed by COMPENDEX, PASCAL, NTIS, BIOSIS, and METADEX. These data bases accounted for over 90 percent of the disk storage used by IRS.

An excellent review of the techniques involved for effective online searching the information in the ESA/IRS has been given by Kingsmill.[23]

The services currently available from ESA/IRS include:

Online Bibliographic Data Base

Name of Data Bases	*No. of items online*	*Dating from*
AB/Inform	118,000	1971
Acqualine (Water Research Centre)	19,000	1974
BIOSIS	1,934,000	1973
CAB (Commonwealth Agricultural Bureaux)	988,000	1972
CHEMABS (based on CA-SEARCH)	4,102,000	1969
COMPENDEX	892,000	1969
EDF-DOC (Electrical Power Industry)	202,000	1972
ENERGYLINE	58,000	1971
ENVIROLINE	79,000	1971

116

Name of Data Base (continued)	*No. of items online*	*Dating from*
FSTA (Food Science & Technology Abstracts)	187,000	1969
France-Actualite	56,000	1978
INSPEC	1,327,000	1971
ISMEC	106,000	1973
METADEX	323,000	1969
NASA (1)	1,063,000	1962
NTIS	719,000	1964
Oceanic Abstracts	119,000	1964
PASCAL (Bulletin Signaletique)	3,589,000	1973
PNI (Pharmaceutical News)	49,000	1974
Pollution Abstracts	70,000	1970
WTI (World Transindex)	56,000	1978
World Aluminium-Abstracts	74,000	1968
AGRIS (are available via the joint IAEA/ESA)	470,000	1975
INIS (DIDEX experiment)	400,000	1975

Online Data Banks

ELECOMPS	(Electronic Components)
ELSPECS	(Electronic Components qualification specifications and approvals)
LEDA	(Earth Resources imagery)
SPACECOMPS	(Electronic Components approved for use in spacecraft)

Online Data Entry (ODE)

Private File Service

TEL-42 High-speed Terminal

Online original document ordering

Online SDI profile entry

SDI service

Standard Titles – Current awareness service

Consultancy

IRS can make available its expertise based on 10 years' experience in online operations to assist organisations entering this field.

ESA/IRS is the only European online service to offer the NASA aerospace data base (STAR and IAA) under the terms of the NASA/ESA information exchange agreement.

European Space Agency
Information Retrieval Service
ESRIN
Via Galileo Galilei
00044 Frascati, Italy

5.2 International Atomic Energy Agency (IAEA)

The Division of Scientific and Technical Information of the IAEA, located near Vienna, provides the central coordination and computer services for the production of the International Nuclear Information System (INIS) data base; support services are also provided to the U.N. Food and Agriculture Organisation (FAO) in the production of its AGRIS, or Agricultural Sciences and Technology data base. In 1977 the IAEA introduced an experimental direct access project (DAP) to enable INIS centres in the member countries to search the INIS data base mounted on the IAEA Headquarters computer by dialing direct to Vienna.

This experiment was very successful, and the project has since been expanded, first, by incorporating the AGRIS data base to support the INIS/AGRIS Direct Access Project (DAP), and secondly, in collaboration with the European Space Agency/Information Retrieval Service (ESA/IRS), in introducing the Distributed Database Experiment (DIDEX).

By means of a link between the computer centres of IAEA and ESA/IRS, DIDEX enables the users of ESA/IRS accessing the service via any network other than EURONET to search the INIS and AGRIS data bases as though they were mounted on the IRS computer. The initial link is by means of land line, but a satellite link Rome/Vienna is under study.

IAEA employs an advanced version of the IBM STAIRS search software for the DAP/DIDEX projects. Data bases available are:

Name of Data Base		*No. of items*	*Dating from*
INIS	(International Nuclear Information System)	400,000	1975
AGRIS	(Agricultural Sciences & Technology)	470,000	1975

International Atomic Energy Agency
Division of Scientific & Technical Information
INIS Section
Wagramerstrasse 5
P.O. Box 100
A-1500 Vienna
Austria

European Space Agency
Information Retrieval Service
ESRIN
Via Galileo Galilei
Italy

5.3 TELESYSTEMES (France)

Telesystemes is a subsidiary of France Cable et Radio operating under the aegis of the Mission Interministerielle de l'Information Scientifique et Technique (MIDIST).

The service uses MISTRAL software supplemented with the DARC software for chemical substructure searching, implemented on a CII-Honeywell Bull IRIS 80 computer. The service may be accessed via the French TRANSPAC network and through EURONET and TYMNET or TELENET.

Data bases include:

Name of data base	
CA-SEARCH	
CBAC (Chemistry-biology)	
PASCAL	
CANCERNET	
TITUS (Textiles)	
EDF-DOC*	(Electric power indust.)
NORIANE*	(Industrial standards)
IALINE*	(Agriculture and food)
FRANCIS	(Energy)
BIPA*	(Political)
TELEDOC*	(Telecommunications)
CBNOM	(Nomenclature for CBAC)
CNRSLAB	(CNRS current research project)
SCOLA	(PASCAL training file)

Telesystemes S.A.
40, rue du Cherche-Midi
75006 Paris
France

5.4 SPIDEL (Service pour l'Information et la Documentation En Ligne) (France)

SPIDEL is a department of the Societe pour l'Informatique (SPI), a subsidiary of the Pechiney Ugine Kuhlmann group specialising in computer timesharing. The service employs IBM STAIRS software, and its policy is to offer specialised data bases of interest to commercial organisations; SPIDEL may be accessed via the French TRANSPAC network, and through EURONET and TYMNET.

Data bases (the majority in the French language) offered:

CETIM	Mechanical
CIS-BIT	Occupational Health and Safety
EDF-DOC	Electric power industry

* Data base in the French language, multilingual thesaurus may be available.

BIIPAM	Engineering, metallurgy, foundry
AFEE	Water pollution and treatment
PASCAL	Section covering metallurgy, foundries, welding
MERLIN G	Management
MERLIN T	Electricity, electronics
SGB	Banking, finance, management
AGRIS	Agriculture, agro foods
AGREP	Agricultural research project
ENDOC	Environment information centres
ENREP	Environmental research projects
KOMPASS-FRANCE	Directory of French companies
DAFSA-RESO	Who owns whom

SPI
Department SPIDEL
98 Boulevard Victor Hugo
92115 Clichy
France

5.5 INKA Fachinformationszentrum 4 (Fachinformationszentrum Energie, Physik, Mathematik GmbH, Karlsruhe)

This centre offers an online retrieval service based on data bases that include those of the Fachinformationszentrum Technik e.V., Frankfurt, for which INKA provides the computing centre. The online service is available from 8:30 to 17:30 on weekdays.

INKA uses the DIRS 2 (Direct Information Retrieval System) applications software, developed by the Deutsches Institut für Medizinische Dokumentation und Information (DIMDI), operating on Siemens 7000 series data-processing equipment. A series of Siemens data terminals (8150, 8151, 8152, 8160-21, 8161) are supported, also the Hazeltine Modular One terminal. In addition, the centre is lined to EURONET, and the EURONET Common Command Language (CCL) has been implemented.

On line data bases include:

Name of Data Base	*No. of items online*	*Dating from*
BAUFO – Building research projects	–	–
COMPENDEX	450,000	1975
EDB – Energy data base	400,000	1976
INKA-CONF – Conference announcements	–	–
INKA-DATACOMP – Data in energy & physics	3,000	1976
INKA-MATH – Mathematics data base	–	–
INKA-NUCLEAR	975,000	1969
INPADOC-IFS – Patents family file	–	–
INPADOC-IPG – Patents gazette	–	–
INSPEC	1,200,000	1971
NTIS	–	–
ORLIS – Urban & regional planning	–	–
RSWB – Town planning	–	–
SDIMI – Metallurgy	–	–

INKA
Fachinformationszentrum Energie,
Physik, Mathematik
7514 Eggenstein-Leopoldshafen 2
Federal Republic of Germany

5.6 DIMDI (Deutsches Institut für Medizinische Dokumentation und Information, Köln)

Fachinformationszentrum 1 (Fachinformationszentrum public health, medicine, biology, and sports).

DIMDI was founded in 1969 to provide a computer based information storage and retrieval service in the field of medicine and related subjects (now termed biosciences).

The institute has developed its own data base management system, GRIPS (General Relation Based Information Processing System) which incorporates an interactive retrieval system termed DIRS-2 (DIMDI Information Retrieval System – Version 2). These systems are operated on Siemens 7000 series data-processing equipment.

The command language for DIRS-2 is English. The EURONET Common Command Language has also been implemented.

DIMDI offers the current data base segments listed below during dialogue time. The back files may, however, be searched offline in a manner similar to the BRS system. In addition, the MEDLARS-1 data base (307,000 items covering 1964 and 1965) is available online at certain times.

The institute operates its own private data network called DIMDINET, which supports both dedicated and dial-in terminals in addition to a link with EURONET.

Online data bases include:

Name of Data Base	*No. of items online*	*Dating from*
MEDLARS-2	688,000	1978
BIOSIS Previews	754,499	1978
CANCERLIT	211,000	1963
CANCERPROJ	17,600	1974
SCISEARCH	443,900	1979
SOCIAL SCISEARCH	440,200	1977
CAB ANIMAL	518,900	1972
AGREP	20,400	1975
Psychological Abstracts	317,000	1967
Excerpta Medica	662,000	1978
FSTA (Food Science & Technology Abstracts)	189,000	

DIMDI
Weisshausstrasse 27
Postfach 420580
5000 Köln 41
Federal Republic of Germany

5.7 DATA-STAR (Switzerland)

This completely new service was announced in 1980 by Radio Suisse Limited in collaboration with Predicasts International and Bibliographic Retrieval Services Inc. The service was scheduled to start in the autumn of 1980 with at least 10 major data bases in chemicals, biology, social sciences, marketing, and business. The project is funded by Radio Suisse Limited.

The search system to be used is the BRS modified IBM STAIRS system. BRS will also supply its data bases in some cases. Predicasts European office will market this new service, and there are plans to provide help desks manned by English-French- and German-speaking staff.

Data bases announced at the time of writing:

NTIS
CA-SEARCH
BIOSIS
MEDLARS
PROMPT
AB/INFORM
Psychological Abstracts
Nat. Inst. Mental Health Abs.
Int. Pharmaceutical Abs.
Management Contents

DATA-STAR
199 High Street
Orpington BR6 0PF
United Kingdom

5.8 BLAISE (British Library Automated Information Service)

This system, operated by the British Library, incorporates two primary online services. An information retrieval service is based on the National Library of Medicine (NLM) ELHILL software; and online library cataloguing is provided by means of specially developed software, the BLAISE Editor. In addition, the system enables online document orders to be made to the British Library's Lending Division.

The BLAISE service is operated on IBM computers located at a computer bureau in Essex. The ELHILL software used is similar to the SDC ORBIT package.

The online data bases include:

UK MARC data base from 1950

Library of Congress MARC data base from 1968
(converted by British Library to UK MARC format); together these data bases total nearly 2 million records.

MEDLARS data base from 1964.

The Library plans to augment these basic data bases with several others including records from the British Library's Department of Printed Books; extra MARC (EMMA) data from the 40 or more libraries using its cataloguing services; bibliographic data from the 18th Century Short Title Catalogue project; and the International Serials Data Service (ISDS) files.

The BLAISE service may be accessed by several means. UK users may dial direct to Harlow, Essex, or dial to the BLAISE private network in the United Kingdom; from the United States users may dial either TYMNET or TELENET and obtain connection via the UK International Packet Switched Service (IPSS); in Europe users may connect via EURONET.

BLAISE
7 Rathbone Street
London W1P 2AL
United Kingdom

5.9 PERGAMON-INFOLINE (United Kingdom)

Infoline was originally established in 1976 by a partnership of The British Chemical Society, The British Institute of Electrical Engineers, The British Library, and the Department of Industry. Derwent Publications Limited, part of the Thomson Organization, became the fifth partner in early 1977.

The published objectives of this service were to develop, operate, and market computer-based online services to the technologically based manufacturing and processing industries, with particular emphasis on the chemical, pharmaceutical, electronic, and energy sectors.

In 1980, Infoline was acquired by Pergamon Press Limited, the scientific and educational publisher. The restructured company is known as PERGAMON-INFOLINE, which is a wholly owned subsidiary of Pergamon Press Limited. The service intends to continue to offer its Chemical Abstracts data base and to add a chemical name file as previously planned. Other data bases to be added include INSPEC and a US patent information data base being developed by another Pergamon company.

Infoline users may connect via a private data network with nodes in the United Kingdom, France, and Germany; via EURONET; or from the United States by dialing TYMNET or TELENET when they are connected through the (UK) International Packet Switched Service (IPSS).

Pergamon-Infoline
Brettenham House
Lancaster Place
London WC2E 7EN
United Kingdom

6. FUTURE DEVELOPMENTS

What does the future, particularly the mid and late 1980s foretell for information retrieval technology in the context of this, the final chapter of the manual? An immediate prediction with virtually no chance of error is that there will be a superabundance of all types of information that can be retrieved with ease. In 1970 only a few interactive retrieval systems were in operation, searching against a handful of machine-readable data bases.

Ten years later we have witnessed a proliferation of data bases, somewhere in excess of 500 of them.[16] In this paper your authors have presented a few selected data bases or data base collections in North America and Europe and the means of accessing these data bases by leased lines and packet-switching data communications networks.

We are probably still in a rather primitive phase. Without any doubt, the capacities and versatilities of data communications networks will be expanded. The use of satellite communications links for the type of information retrieval discussed in this section is projected for the early 1980s.

By the end of the present decade, computer storage and data transmission charges will have probably decreased. EURONET services will have expanded into Switzerland and a few other countries that have, in the meantime, become member states of the European Community. Solutions for international agreements on tariff structures, transit rights, and invoicing procedures as EURONET expands are contemplated.

According to Aitchison[24] in the not too distant future it will be possible to use the same networks for searching data bases and obtaining the full text of documents by facsimile or normal digital techniques. Work is being encouraged by the Commission of the European Communities and elsewhere, and is likely to be developed on a large scale in the next few years.

7. ACKNOWLEDGEMENTS

This section concludes the four-year, four-volume effort for the "Manual of Documentation Practices . . ." The section authors join Mr Colin Schuler, the General Editor, in the sincere expression of gratitude to all who have contributed to the overall manual and specifically to the authors of the first eleven chapters. The section authors, speaking for all of the authors, wish to thank the AGARD Technical Information Panel for having the opportunity to participate in this internationally-flavoured and most worthwhile project.

REFERENCES

1. Brandhorst, W.T. Eckert, P.F. — *Document Retrieval and Dissemination Systems*. In: Cuadra, Carlos A.; ed. Annual Review of Information Science and Technology, Vol.7, 1972.

2. Martin, James — *Introduction to Teleprocessing*. Prentice-Hall, Inc., Englewood, N.J., 1972.

3. Martin, James — *Telecommunications and the Computer*. Second Edition. Prentice-Hall, Inc., Englewood, N.J., 1976.

4. – — *CCITT Fifth Plenary Assembly, The CCIT Green Book, Vol.VII: Telegraph Technique*, International Telecommunications Union, Geneva, 1973.

5. – — NASA Literature Search No.44042, *Packet Switching*, July 29, 1980.

6. Davies, D.W. Barber, D.L.A. — *Communications Networks for Computers*, John Wiley & Sons, 1972.

7. – — *ARPANET Information Brochure* – Defense Communications Agency, Washington D.C., AD-A052672, March 1978.

8. – — *ARPANET Resource Handbook* – Defense Communications Agency, Washington D.C., AD-E100173, October 1978.

9. – — *Telenet Reference Manual* – Public Packet Network Service. May 1979.

10. Roberts, L.G. — *Packet Network Design – The Third Generation*. Telenet Communications Corp., Washington D.C., 1977.

11. Wood, David C. — *A Survey of the Capabilities of 8 Packet Swtiching Networks*. The Mitre Corporation, McLean, Va., 1978. In: Computer Network: A Tutorial, 1978 Revision and Update.

12. – — *National and International Networks of Libraries, Documentation and Information Centres*. AGARD Conference Proceedings No.158, March 1975.

13. Rinde, Joseph Caisse, Arther — *Passive Flow Control Techniques for Distributed Networks*. Tymshare, Inc., Cupertino, CA., February 1979.

14. Sullivan, Neil — *TYMNET – Experiences in Maintaining a Large Packet Network*. Tymnet, Inc., Cupertino, CA., November 1978.

15. Rinde, Joseph — *TYMNET I: An Alternative to Packet Switching Technology*. Tymshare, Inc., Cupertino, CA., 1976.

16. Williams, Martha E. — *Computer-Readable Data Bases – A Directory and Data Sourcebook*. American Society for Information Science. CODEN: 357PAA; ISBN 0-914236-45-8, p.1368, October 1979.

17. – *NASA/RECON SYSTEM – User's Manual* – Revision 3, May 1980.

18. – *DOE/RECON User's Manual.* 1975.

19. – *Self-Training Module for Users of the Defense RDT&E On-Line System* (Draft), September 1979.

20. – *A Brief Guide to DIALOG Searching*, September 1976.

21. – *SDC Search Service ORBIT User Manual*, April 1975.

22. – *BRS System Reference Manual and Data Base Search Guides*, September 1977.

23. Kingsmill, B.A. *Introduction of On-Line Searching in Information Service.* AGARD CP-294, 1980.

24. Aitchison, T. *Future Trends in Information.* IEE News. November 1980.

REPORT DOCUMENTATION PAGE			
1. Recipient's Reference	2. Originator's Reference AGARD-AG-235 Volume IV	3. Further Reference ISBN 92-835-1382-7	4. Security Classification of Document UNCLASSIFIED

5. Originator Advisory Group for Aerospace Research and Development
North Atlantic Treaty Organization
7 rue Ancelle, 92200 Neuilly sur Seine, France

6. Title MANUAL OF DOCUMENTATION PRACTICES APPLICABLE TO DEFENCE-AEROSPACE SCIENTIFIC AND TECHNICAL INFORMATION – Volume IV: Security Storage and Control, Organisation and Management, Networks and External Sources of Information

7. Presented at

8. Author(s)/Editor(s)	9. Date
S.C.Schuler, General Editor	March 1981
10. Author's/Editor's Address	**11. Pages**
	124

12. Distribution Statement This document is distributed in accordance with AGARD policies and regulations, which are outlined on the Outside Back Covers of all AGARD publications.

13. Keywords/Descriptors

Information sciences	Data storage	Personnel
Data recording	Data bases	Publications
Networking	Security storage	Telecommunications
Organisation	Libraries	On-line information systems

14. Abstract

The last of four separately published volumes describing the basic documentation practices involved in the initial setting up and operation of an Information-Library organisation to provide defence-aerospace information services. The focus is on a practical, rather than theoretical, approach for both the senior person setting up a new system as well as junior staff who may be using the manual as a training aid.

This volume consists of three main sections. The first is concerned with basic problems in the security control and storage of classified and other sensitive documents. Guidelines are given for setting up procedures for document movements, housekeeping and physical security. The second section gives a general background to organisational factors involved in establishing an information centre. It also discusses accommodation requirements, staffing, budgets and promotional activities. In the final section the basic aspects of the telecommunications and networking are reviewed and information given on the availability and use of on-line data bases in the USA and Europe.

This AGARDograph was prepared at the request of the Technical Information Panel of AGARD.

AGARDograph No.235 Advisory Group for Aerospace Research and Development, NATO MANUAL OF DOCUMENTATION PRACTICES APPLICABLE TO DEFENCE-AEROSPACE SCIENTIFIC AND TECHNICAL INFORMATION – Volume IV Security Storage and Control, Organisation and Management, Networks and External Sources of Information S.C.Schuler, General Editor Published March 1981 124 pages The last of four separately published volumes describing the basic documentation practices involved in the initial setting up and operation of an Information-Library organisation to provide defence-aerospace information P.T.O.	AGARD-AG-235 Vol.IV Information sciences Data recording Networking Organisation Data storage Data bases Security storage Libraries Personnel Publications Telecommunications On-line information systems	AGARDograph No.235 Advisory Group for Aerospace Research and Development, NATO MANUAL OF DOCUMENTATION PRACTICES APPLICABLE TO DEFENCE-AEROSPACE SCIENTIFIC AND TECHNICAL INFORMATION – Volume IV Security Storage and Control, Organisation and Management, Networks and External Sources of Information S.C.Schuler, General Editor Published March 1981 124 pages The last of four separately published volumes describing the basic documentation practices involved in the initial setting up and operation of an Information-Library organisation to provide defence-aerospace information P.T.O.	AGARD-AG-235 Vol.IV Information sciences Data recording Networking Organisation Data storage Data bases Security storage Libraries Personnel Publications Telecommunications On-line information systems
AGARDograph No.235 Advisory Group for Aerospace Research and Development, NATO MANUAL OF DOCUMENTATION PRACTICES APPLICABLE TO DEFENCE-AEROSPACE SCIENTIFIC AND TECHNICAL INFORMATION – Volume IV Security Storage and Control, Organisation and Management, Networks and External Sources of Information S.C.Schuler, General Editor Published March 1981 124 pages The last of four separately published volumes describing the basic documentation practices involved in the initial setting up and operation of an Information-Library organisation to provide defence-aerospace information P.T.O.	AGARD-AG-235 Vol.IV Information sciences Data recording Networking Organisation Data storage Data bases Security storage Libraries Personnel Publications Telecommunications On-line information systems	AGARDograph No.235 Advisory Group for Aerospace Research and Development, NATO MANUAL OF DOCUMENTATION PRACTICES APPLICABLE TO DEFENCE-AEROSPACE SCIENTIFIC AND TECHNICAL INFORMATION – Volume IV Security Storage and Control, Organisation and Management, Networks and External Sources of Information S.C.Schuler, General Editor Published March 1981 124 pages The last of four separately published volumes describing the basic documentation practices involved in the initial setting up and operation of an Information-Library organisation to provide defence-aerospace information P.T.O.	AGARD-AG-235 Vol.IV Information sciences Data recording Networking Organisation Data storage Data bases Security storage Libraries Personnel Publications Telecommunications On-line information systems

services. The focus is on a practical, rather than theoretical, approach for both the senior person setting up a new system as well as junior staff who may be using the manual as a training aid.

This volume consists of three main sections. The first is concerned with basic problems in the security control and storage of classified and other sensitive documents. Guidelines are given for setting up procedures for document movements, housekeeping and physical security. The second section gives a general background to organisational factors involved in establishing an information centre. It also discusses accommodation requirements, staffing, budgets and promotional activities. In the final section the basic aspects of telecommunications and networking are reviewed and information given on the availability and use of on-line data bases in the USA and Europe.

This AGARDograph was prepared at the request of the Technical Information Panel of AGARD.

ISBN 92-835-1382-7

services. The focus is on a practical, rather than theoretical, approach for both the senior person setting up a new system as well as junior staff who may be using the manual as a training aid.

This volume consists of three main sections. The first is concerned with basic problems in the security control and storage of classified and other sensitive documents. Guidelines are given for setting up procedures for document movements, housekeeping and physical security. The second section gives a general background to organisational factors involved in establishing an information centre. It also discusses accommodation requirements, staffing, budgets and promotional activities. In the final section the basic aspects of telecommunications and networking are reviewed and information given on the availability and use of on-line data bases in the USA and Europe.

This AGARDograph was prepared at the request of the Technical Information Panel of AGARD.

ISBN 92-835-1382-7

services. The focus is on a practical, rather than theoretical, approach for both the senior person setting up a new system as well as junior staff who may be using the manual as a training aid.

This volume consists of three main sections. The first is concerned with basic problems in the security control and storage of classified and other sensitive documents. Guidelines are given for setting up procedures for document movements, housekeeping and physical security. The second section gives a general background to organisational factors involved in establishing an information centre. It also discusses accommodation requirements, staffing, budgets and promotional activities. In the final section the basic aspects of telecommunications and networking are reviewed and information given on the availability and use of on-line data bases in the USA and Europe.

This AGARDograph was prepared at the request of the Technical Information Panel of AGARD.

ISBN 92-835-1382-7

services. The focus is on a practical, rather than theoretical, approach for both the senior person setting up a new system as well as junior staff who may be using the manual as a training aid.

This volume consists of three main sections. The first is concerned with basic problems in the security control and storage of classified and other sensitive documents. Guidelines are given for setting up procedures for document movements, housekeeping and physical security. The second section gives a general background to organisational factors involved in establishing an information centre. It also discusses accommodation requirements, staffing, budgets and promotional activities. In the final section the basic aspects of telecommunications and networking are reviewed and information given on the availability and use of on-line data bases in the USA and Europe.

This AGARDograph was prepared at the request of the Technical Information Panel of AGARD.

ISBN 92-835-1382-7

AGARD

NATO OTAN

7 RUE ANCELLE · 92200 NEUILLY-SUR-SEINE

FRANCE

Telephone 745.08.10 · Telex 610176

DISTRIBUTION OF UNCLASSIFIED AGARD PUBLICATIONS

AGARD does NOT hold stocks of AGARD publications at the above address for general distribution. Initial distribution of AGARD publications is made to AGARD Member Nations through the following National Distribution Centres. Further copies are sometimes available from these Centres, but if not may be purchased in Microfiche or Photocopy form from the Purchase Agencies listed below.

NATIONAL DISTRIBUTION CENTRES

BELGIUM
Coordonnateur AGARD – VSL
Etat-Major de la Force Aérienne
Quartier Reine Elisabeth
Rue d'Evere, 1140 Bruxelles

CANADA
Defence Science Information Services
Department of National Defence
Ottawa, Ontario K1A OK2

DENMARK
Danish Defence Research Board
Østerbrogades Kaserne
Copenhagen Ø

FRANCE
O.N.E.R.A. (Direction)
29 Avenue de la Division Leclerc
92320 Châtillon sous Bagneux

GERMANY
Fachinformationszentrum Energie,
Physik, Mathematik GmbH
Kernforschungszentrum
D-7514 Eggenstein-Leopoldshafen 2

GREECE
Hellenic Air Force General Staff
Research and Development Directorate
Holargos, Athens

ICELAND
Director of Aviation
c/o Flugrad
Reykjavik

ITALY
Aeronautica Militare
Ufficio del Delegato Nazionale all'AGARD
3, Piazzale Adenauer
Roma/EUR

LUXEMBOURG
See Belgium

NETHERLANDS
Netherlands Delegation to AGARD
National Aerospace Laboratory, NLR
P.O. Box 126
2600 A.C. Delft

NORWAY
Norwegian Defence Research Establishment
Main Library
P.O. Box 25
N-2007 Kjeller

PORTUGAL
Direcção do Serviço de Material
da Força Aerea
Rua da Escola Politécnica 42
Lisboa
Attn: AGARD National Delegate

TURKEY
Department of Research and Development (ARGE)
Ministry of National Defence, Ankara

UNITED KINGDOM
Defence Research Information Centre
Station Square House
St. Mary Cray
Orpington, Kent BR5 3RE

UNITED STATES
National Aeronautics and Space Administration (NASA)
Langley Field, Virginia 23365
Attn: Report Distribution and Storage Unit

THE UNITED STATES NATIONAL DISTRIBUTION CENTRE (NASA) DOES NOT HOLD STOCKS OF AGARD PUBLICATIONS, AND APPLICATIONS FOR COPIES SHOULD BE MADE DIRECT TO THE NATIONAL TECHNICAL INFORMATION SERVICE (NTIS) AT THE ADDRESS BELOW.

PURCHASE AGENCIES

Microfiche or Photocopy
National Technical
Information Service (NTIS)
5285 Port Royal Road
Springfield
Virginia 22161, USA

Microfiche
Space Documentation Service
European Space Agency
10, rue Mário Nikis
75015 Paris, France

Microfiche
Technology Reports
Centre (DTI)
Station Square House
St. Mary Cray
Orpington, Kent BR5 3RF
England

Requests for microfiche or photocopies of AGARD documents should include the AGARD serial number, title, author or editor, and publication date. Requests to NTIS should include the NASA accession report number. Full bibliographical references and abstracts of AGARD publications are given in the following journals:

Scientific and Technical Aerospace Reports (STAR)
published by NASA Scientific and Technical
Information Facility
Post Office Box 8757
Baltimore/Washington International Airport
Maryland 21240, USA

Government Reports Announcements (GRA)
published by the National Technical
Information Services, Springfield
Virginia 22161, USA

Printed by Technical Editing and Reproduction Ltd
Harford House, 7–9 Charlotte St, London W1P 1HD

ISBN 92-835-1382-7

129